ROADS AND STREETS

SEPTEMBER, 1943

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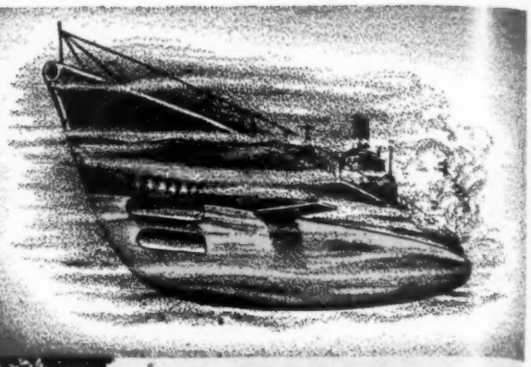
Balanced WEIGHT DISTRIBUTION

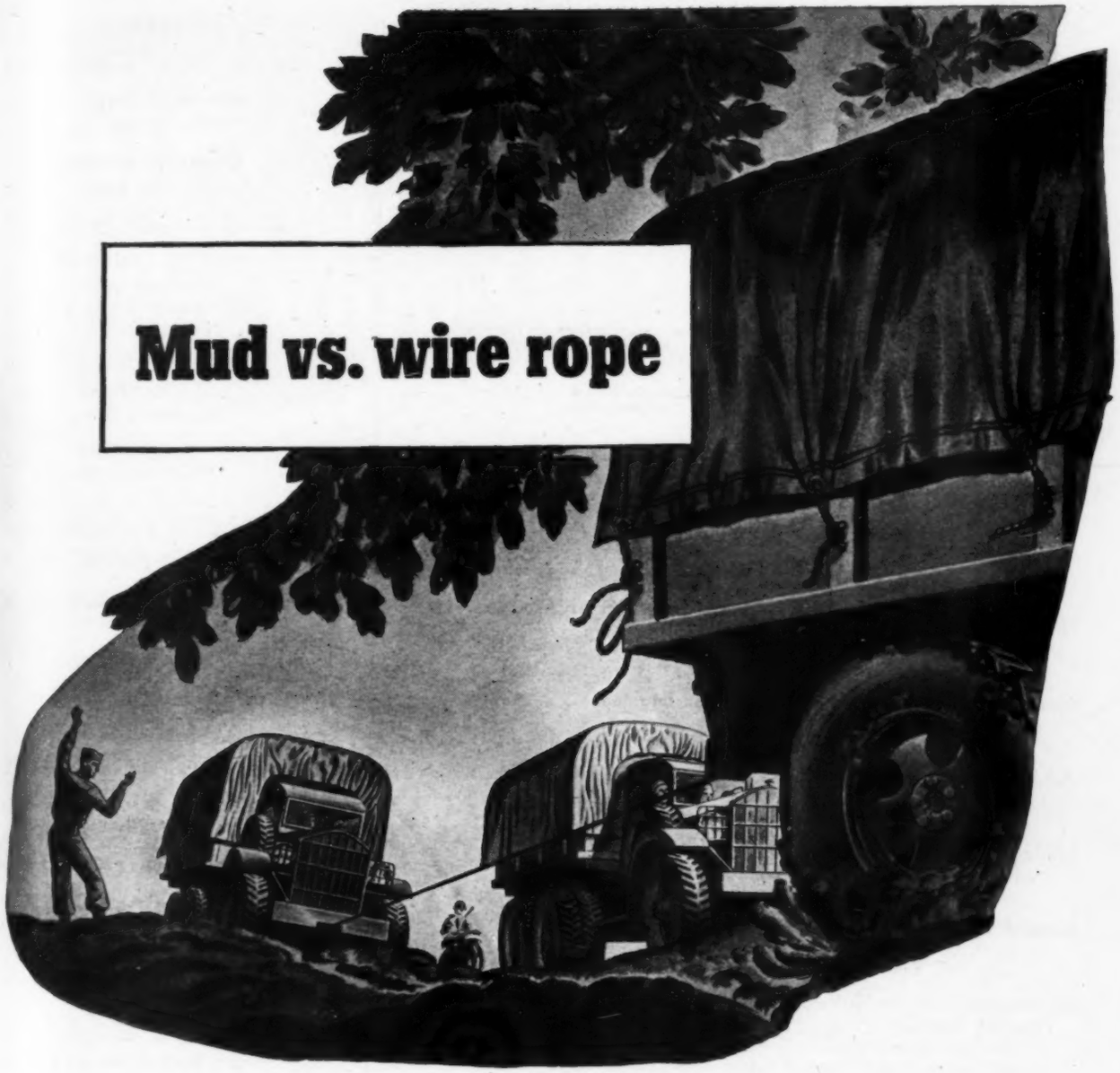


The quick diving and surfacing maneuvers required of submarines call for carefully planned *balance of weight distribution!* . . . Equally important to the efficiency of an Adams Motor Grader is its built-in *balanced weight distribution*—the product of careful and intelligent engineering . . . Adams balance gives enough weight on the rear wheels to provide traction that will utilize all the engine's power *plus* ample weight on the front wheels to hold them in line against skidding. Also sufficient pressure can be exerted on both blade and scarifier to cut any material a motor grader can handle . . . *Balanced weight distribution* is but one of the many Adams features you will like when once again you are permitted to buy equipment for use on peace-time projects!

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

Adams ROAD-BUILDING and EARTH MOVING EQUIPMENT



Mud vs. wire rope

We can't stop the rains, but we *can* provide a means for pulling stalled jeeps, trucks and tanks out of the clutches of that obstinate and gluey old campaigner, General Mud.

Bethlehem's wire rope mill is producing many thousands of emergency winch cables, carried as standard equipment on trucks and tanks. We make up these cables complete, with fittings and hooks all ready to be used. Millions of feet of Bethlehem wire rope have already gone into this service.

Bethlehem Manufactures Wire Rope for all Purposes

ROADS AND STREETS

Vol. 86, No. 9 • September, 1943

CCA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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Published by Gillette Publishing Co. Acceptance under the Act of June 5, 1934, authorized January 25, 1938, at Chicago, Illinois. Subscription price $3.00 per year in the United States, $3.50 per year in Canada, $4.00 per year for foreign mailing.

STAFF

HALBERT P. GILLETTE, Editor-In-Chief

EDWARD S. GILLETTE,
Editor and Publisher

CHARLES T. MURRAY
Managing Editor

JOHN C. BLACK, Field Editor

HAROLD J. McKEEVER
Associate Editor

LT. COL. V. J. BROWN
Publishing Director
(Absent on Military Duty)

H. J. CONWAY
Advertising Editor

L. R. VICKERS
Promotional Director

GILLETTE PUBLISHING COMPANY

330 S. Wells St., Chicago (6), Ill.
ESTABLISHED 1904

PUBLISHERS OF

ROADS AND STREETS

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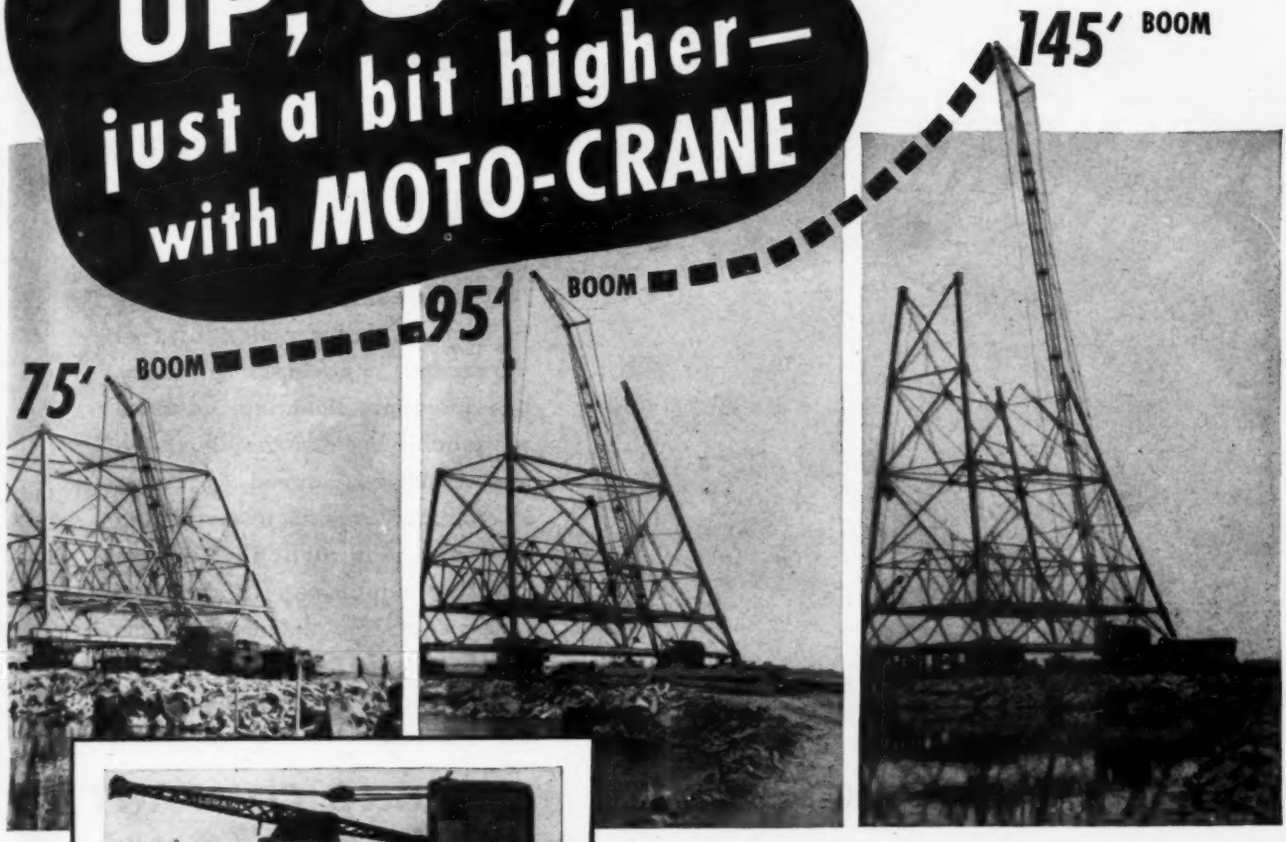
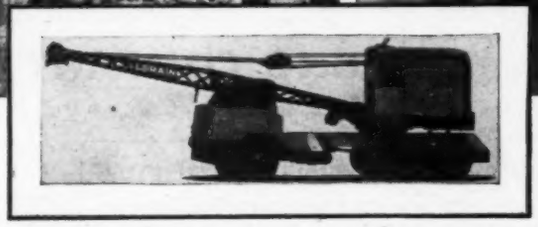
OUR COVER

Arroyo Seco Parkway, Los Angeles, pictured on the cover, is one of the nuclei of a far-reaching Freeway Plan under development by the County Regional Planning Commission. The country's first limited-access road, Arroyo Seco's original 9 miles (State built in 1940) cut L. A.-Pasadena travel time to 12 minutes, has carried 33,000 vehicles daily, is being extended as a freeway to the downtown area this year by completion of a new roadway and the Los Angeles River bridge described on pages 52-53 of this issue.

UP, UP, just a bit higher— with MOTO-CRANE





WHEN Jack climbed up the beanstalk, he had no modern equipment to help him. Today it's a different story, and when progressive contractors like Vogt & Conant, Cleveland, Ohio, were called upon to erect 150' high line cable towers across the Niagara River, they used a mechanized Lorain Moto-Crane to do the job. Here's how they did it.

After building a one-half mile road into the middle of the river, the Moto-Crane (traveling on its 10 rubber-tired wheels) carried 11½ ton wood cribs (suspended on the boom) to the end of the road where they were sunk into the river to form a small island. Then starting with a 60-foot boom and a 15-foot jib extension, and by gradually lengthening the boom to 95', then to 145', they erected the steel tower to the desired 150-foot heighth. Some of the operations at this point called for working at a 68-foot radius and also for traveling around all 4 sides of the tower. This was accomplished even when the 145-foot boom was in place.

It's performance like this that makes the mechanized, fully mobile Moto-Crane the favorite of contractors on the toughest jobs. Post-war construction will require the use of more cost-cutting, time-saving equipment like the modern Moto-Crane. Why not see your Lorain distributor for complete information soon. The Thew Shovel Company, Lorain, Ohio.

thew · Lorain

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

POWER · SPEED · ACCURACY
IN DRAGLINE OPERATION
...HAVE PROVEN KOEHRING ABILITY ON WAR JOBS
Power... Speed... and Accuracy ...are the essential requirements in wartime construction and of paramount importance in dragline operation. Koehring Draglines are reliable because they have the potentialities ... speed ... power ... and accuracy ... all so vital to wartime construction. Adverse working conditions in drainage districts and on defense projects have proven that the Koehring Dragline can be depended upon for essential dragline operation.
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Milwaukee, Wis.
DEPEND ON YOUR KOEHRING DISTRIBUTOR
to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.
KOEHRING
KOEHRING
HEAVY DUTY
HEAVY-DUTY CONSTRUCTION EQUIPMENT

ou Can Produce More Concrete per Hour with ewer Men with Heltzel Bulk Cement Equipment

Heltzel bulk cement plants are furnished for any type of concrete construction with storage capacities from 100 to 1500 bbls. in portable, semi-portable and stationary units.

The illustration in the upper left is the Heltzel Model E-2 Semi-portable Bulk Cement Plant furnished in 300 and 400 bbl. units.

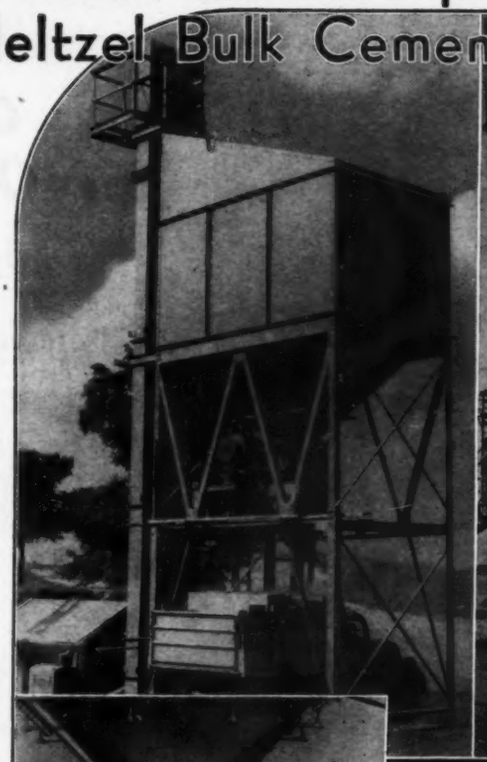
The illustration at the bottom is the Heltzel Model E-1 Portable Bulk Cement Plant furnished from 100 to 250 bbls. capacity. A completely portable unit with the elevator "built in" the bin structure so the entire plant can be moved from one location to another without dismantling the batcher, elevator casing, chain or buckets.

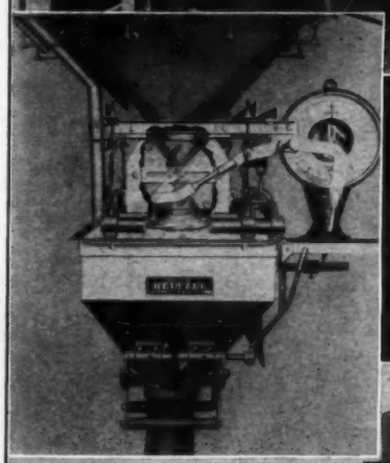
Also shown is the Heltzel Portable Bulk Cement Recirculating Tank which is shipped completely assembled in 300 or 375 bbls. capacity. May be used in conjunction with either the Model E-1 or E-2 Bulk Cement Plant as well as any combination type batching plant.

The Heltzel combination type batching plant for batching all aggregates and cement in one operation is illustrated in the upper right hand picture. These plants are available in capacities from 100 to 400 tons with cement compartment capacities from 125 to 1000 bbls. These plants are fully illustrated and described in Bulletin B-31.

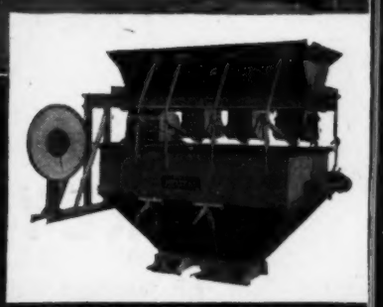
If your project is vital to our Victory Program, Heltzel Bulk Cement and Concrete Construction Equipment will help you speed up your concrete work.

INVESTIGATE!

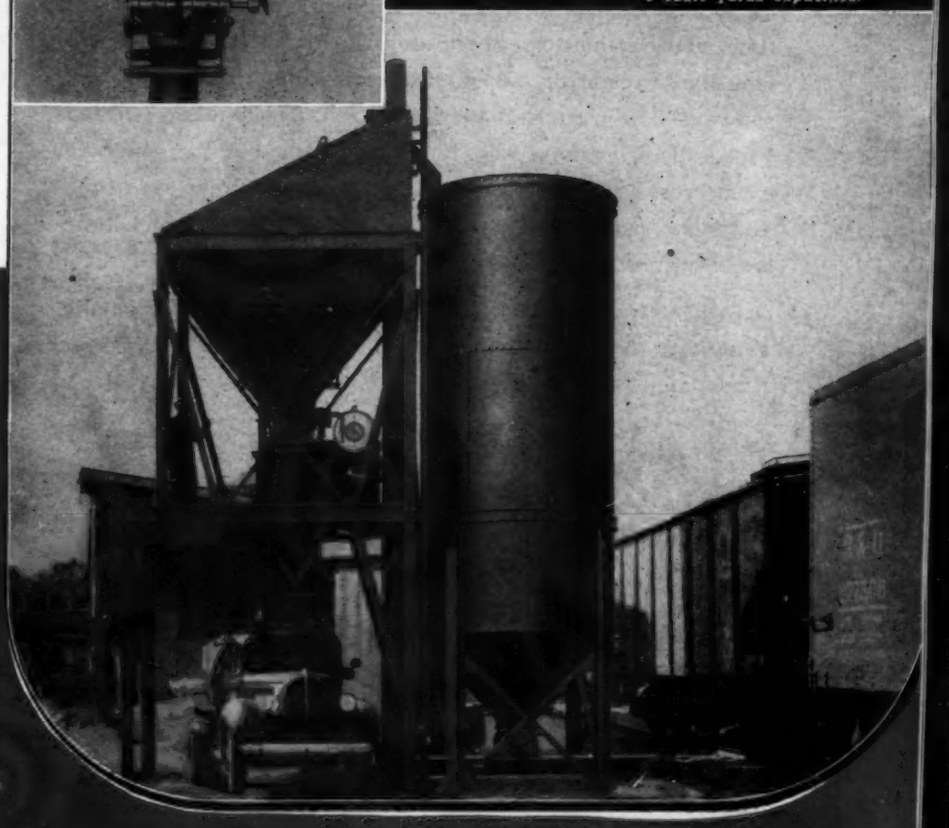




Cut-away view of the Heltzel Dustless Bulk Cement Batcher. Standard for both Model E-1 and E-2 bulk cement plants in capacities from 16 to 50 cubic feet.



Heltzel Combination Batcher with collecting hopper removed. 1 to 5 cubic yards capacities.



HELTZEL SUPERIOR CONCRETE CONSTRUCTION EQUIPMENT

- MILITARY HIGHWAY FORMS
- AIRPORT FORMS
- CURB. CURB AND GUTTER OR SIDEWALK FORMS
- PORTABLE AGGREGATE BATCHING BINS — 30 TO 100 TONS CAPACITY
- PORTABLE AND SEMI-PORTABLE BULK CEMENT BATCHING BINS FROM 100 TO 750 BBLS. CAP.
- CENTRAL MIXING PLANTS
- CEMENT TANKS TO 1500 BBLS.
- TREMIE CHUTING
- CONCRETE FLOOR HOPPERS
- CONCRETE BUCKETS

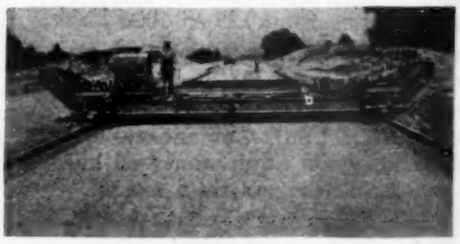
HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.

. . . maybe you won't need a

BUCKEYE R-B POWER FINEGRADER!

IF you had a thousand of these fellows swarming all over your grade you might possibly get as much work done as you could with an R-B Power Finegrader. *In the meantime,* you can help speed the day when the prisoner list will look like a roster of Axis-dom by completing vital roads and runways *now* with R-B machines. These one-man operated Finegraders, available up to 25 ft. width, cut the grade to exact cross section, set a pace for the paving crew, save time and labor, reduce loss of yield and save materials, truck time and transportation.

No other existing equipment can prepare subgrade for paving as quickly, cheaply and accurately as a Buckeye R-B Power Finegrader. Write for bulletin today.



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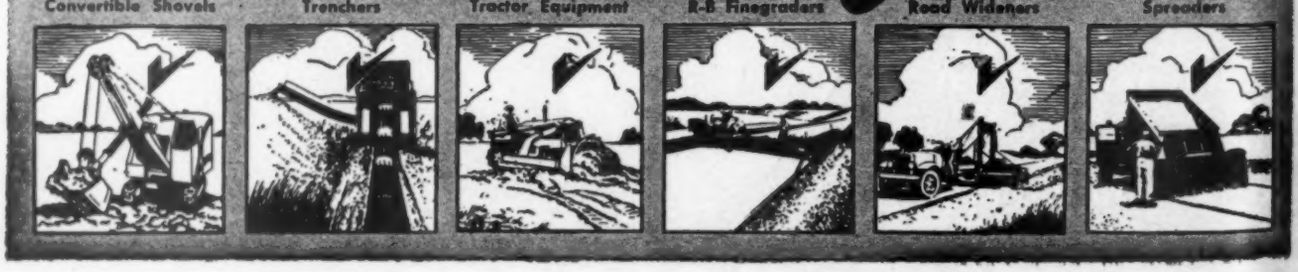
Findlay • Ohio

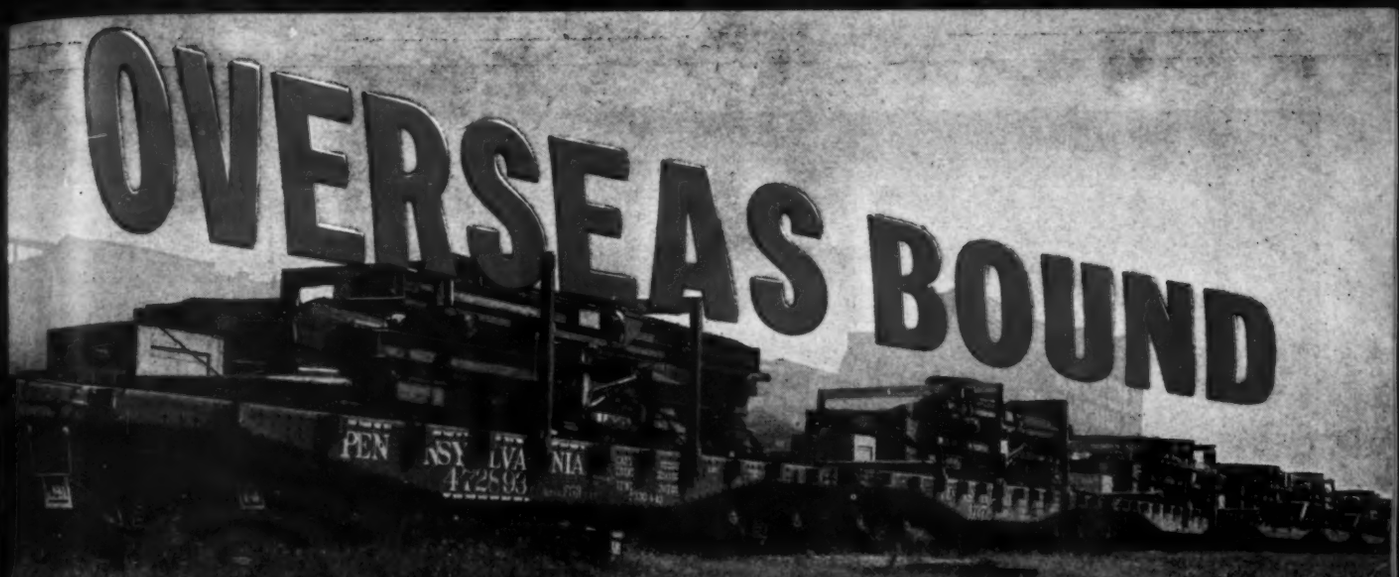
50 YEARS OF PROGRESS BUCKEYE

Built by Buckeye

Check ad page 39



OVERSEAS BOUND



for the FINISHING TOUCH

BLAW-KNOX FINISHING MACHINES are doing a rapid and efficient job of mechanically surfacing concrete runways, taxi-ways and aprons for Allied military air bases all over the world—helping to put the *finishing touch* on the enemy. Teamed with the Blaw-Knox Concrete Paving Spreader as a running mate they are getting air bases built in record smashing time.

In addition to the shipment of Finishing Machines illustrated, large quantities of Blaw-Knox Airport Paving Forms, Concrete Spreaders, Bulk Cement Plants and Aggregate Batching Plants are rolling off the production lines to build the springboards to victory.

Consult your nearest Blaw-Knox Distributor for guidance in maintaining your Blaw-Knox equipment in good working order. Most items of Blaw-Knox Construction Equipment are available for domestic users on essential projects—within limits of government regulations. You can depend on your Blaw-Knox Distributor to handle your inquiry promptly and efficiently.

BLAW-KNOX

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OF BLAW-KNOX COMPANY
2003 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK · CHICAGO · PHILADELPHIA
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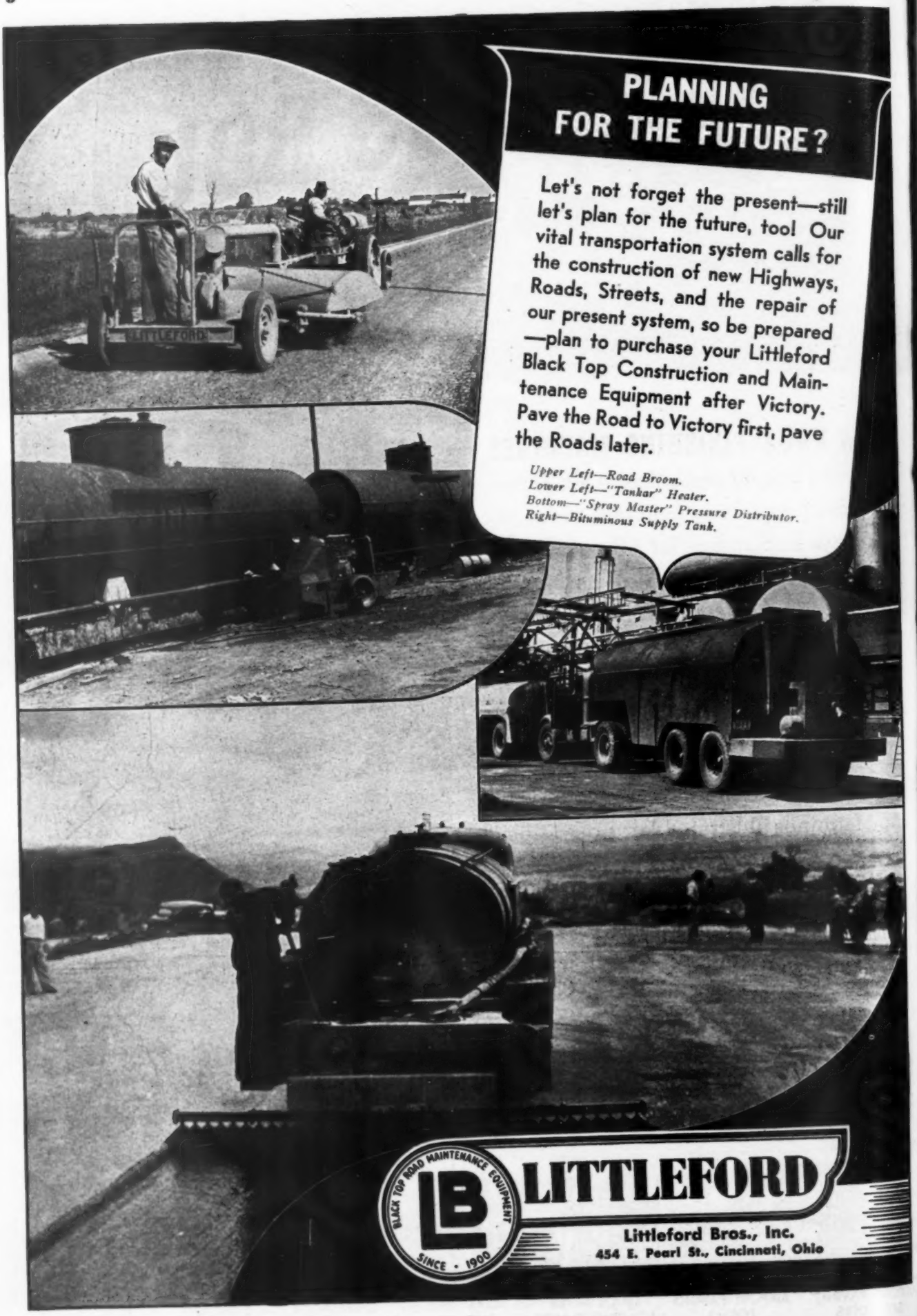
FOR VICTORY BUY U. S. WAR BONDS AND STAMPS


PLANNING
FOR THE FUTURE?
Let's not forget the present—still let's plan for the future, too! Our vital transportation system calls for the construction of new Highways, Roads, Streets, and the repair of our present system, so be prepared —plan to purchase your Littleford Black Top Construction and Maintenance Equipment after Victory. Pave the Road to Victory first, pave the Roads later.
Upper Left—Road Broom.
Lower Left—"Tankar" Heater.
Bottom—"Spray Master" Pressure Distributor.
Right—Bituminous Supply Tank.
LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT
LB
SINCE · 1900
Littleford Bros., Inc.
454 E. Pearl St., Cincinnati, Ohio

WHEN the tools of war are laid aside and the plans of contractors, road officials and machinery builders are put into action, the surface of the American continent is due for some material changes. Far-seeing road officials, recognizing the need to modernize their highway systems, are making plans now to reduce steep grades, widen curves, provide clear driving vision, widen surfaces, improve drainage and, where necessary, separate opposing lanes of traffic.

Contractors, with an eye to the future, are planning to streamline their organizations . . . modernize completely . . . so they will be able to handle a big volume of new construction. You will have to be competitively equipped to get your share of the work . . . and you *will* be . . . by standardizing on Allis-Chalmers equipment. New and better types of earth-moving machines will result from the experiences of the war . . . time-savers that will reduce your cost per yard and enable you to handle more work at more profit. Now is a good time to see your Allis-Chalmers dealer and discuss your post-war equipment needs.

To provide you with more potent "weapons" than ever before, Allis-Chalmers has modernized crawler tractor and motor grader performance . . . put smooth, powerful 2-cycle Diesel engines in both units . . . made the tractor faster, more maneuverable, with a new kind of truck roller lubrication that lasts 25 shifts instead of one . . . added more windrow clearance, more traction and a full range of blade positions to the motor grader. Result — more profit per yard of dirt moved! Performance of the past is a good guide for the future!

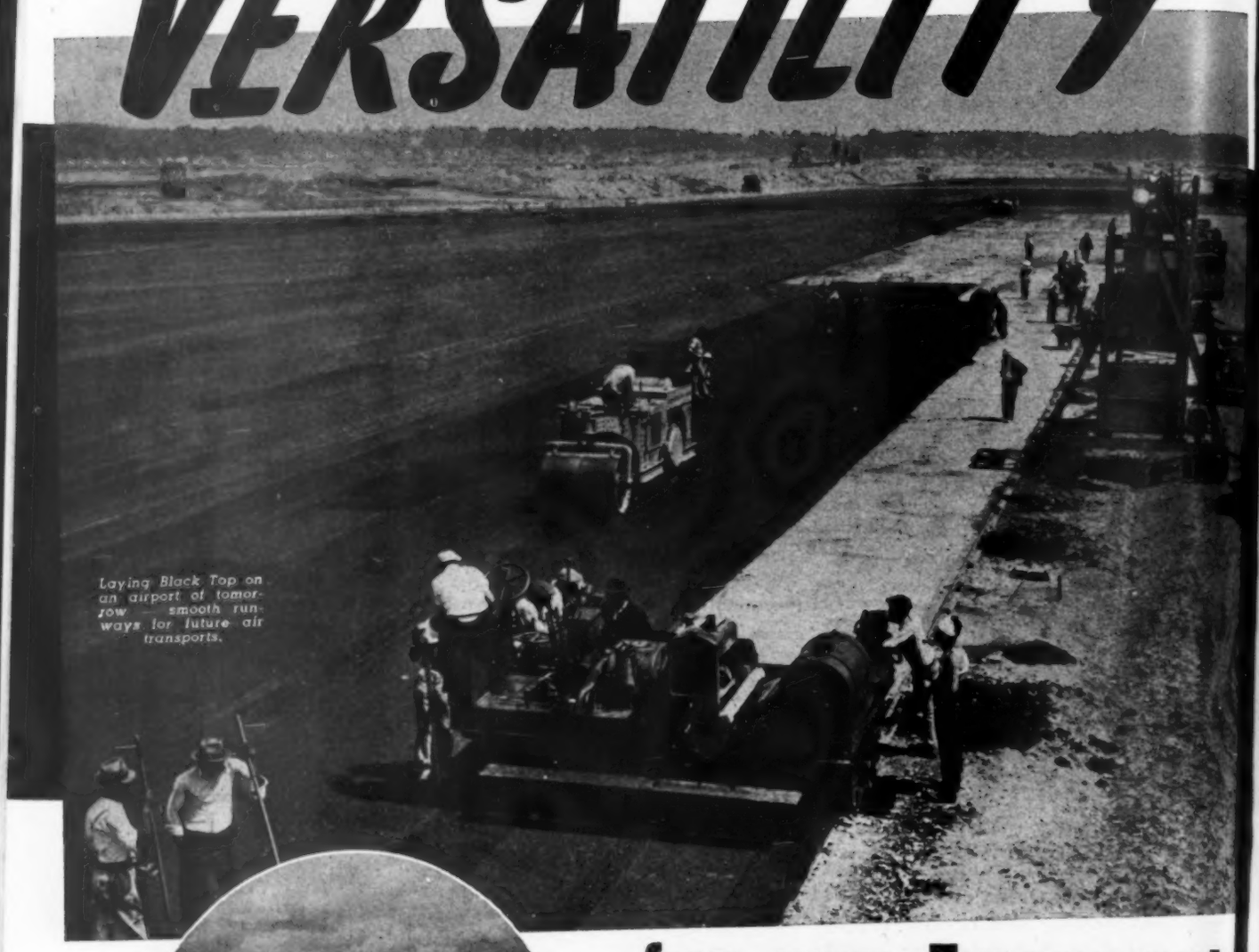
★ ★ ★

ALLIS-CHALMERS

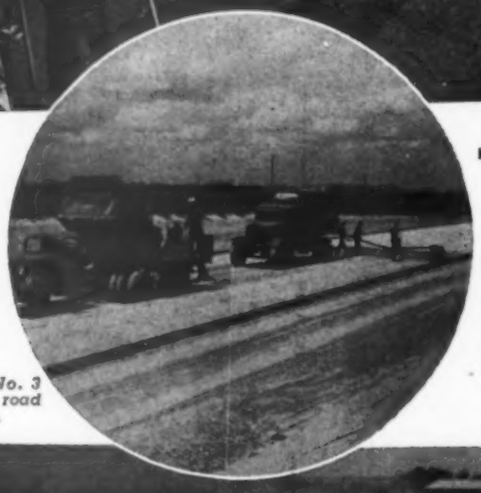
TRACTOR DIVISION, MILWAUKEE, WIS., U. S. A.

ENLIST WITH THE "SEABEES"
SEABEES
U.S. NAVY

VERSATILITY



Laying Black Top on an airport of tomorrow — smooth runways for future air transports.



Laying No. 3 stone for road base.

Laying slag for airport base.

...for any Aggregate spreading problem

The Adnun Black Top Paver is more than a one p machine. Adnun pavers not only lay any type of bla top pavement, hot or cold, but they will also handle a spread rock or slag for base construction. Here again t Adnun exclusive feature of Continuous Course Correcti assures a smoother more accurate layer of material, ass ing accuracy in thickness without waste. Adnun lays to grade "right on the button."

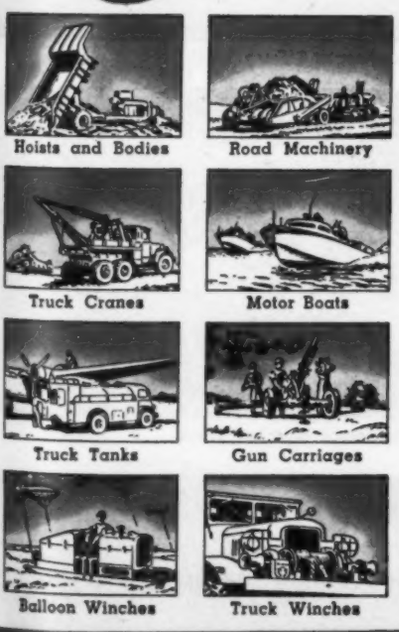
Hydraulic Controls make operation simple and fast. T Power Cut-Off gives full control of the delivery of mater to the grade permitting the flow of material to be sh off at any time. Continuous Course Correction assures accuracy of course thickness and a smoothness of surfa impossible where the paver must travel on the road should

Such versatility as this means a busy machine that g jobs done. That is the kind of a unit you want for your po war black top work. Why not get acquainted. Let us se you details now.

THE FOOTE CO. • NUNDA, NEW YO

ADNUN TRADE MARK REGISTERED **BLACK TOP PAVER**

ON ALL FRONTS!



The mightiest aggregation of fighting men, completely equipped with armament produced by the United Nations—**and by industry in America**—will provide unstoppable power for our fighting men on all fronts.

GW is in the war! Its products, "on all fronts," are geared to this gigantic thrust for freedom. 100% war production—that's been the GW status for a long time—in fact, Gar Wood Industries, Inc., was among the *first* group of manufacturers to convert all its production into war work.

GW products comprise essential equipment, such as: Gun Mounts, Barrage Balloon Winches, Wire Reels, Troop and Cargo Bodies, Mobile Machine Shop Bodies, Truck and Trailer Equipment including Dump Bodies, Hydraulic Hoists, Winches, Cranes, Derricks, Refueling Tanks and Water Tanks—Road Machinery, such as 20-cubic-yard Scrapers, Bulldozers, Road-builders, Tamping Rollers and Rippers—also automatic Heating Equipment, and fast, powerful Boats for the Army and Navy.

OUR ONLY JOB now IS TO
WIN THE WAR

Protect Freedom
BUY WAR BONDS

GAR WOOD INDUSTRIES, INC., Detroit

WARD LAFRANCE..MEANS *"Special"*

THIS country boasts many fine motor truck manufacturers. For the most part, their business is devoted to the manufacture of standard trucks for standard applications.

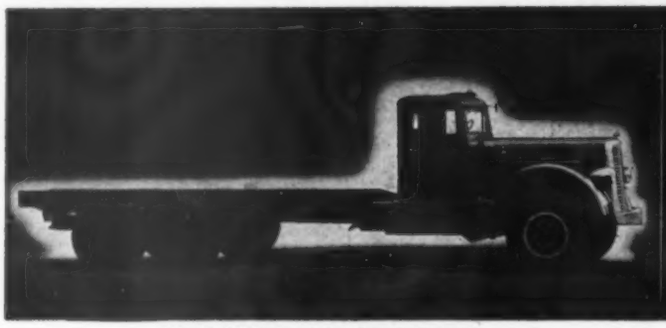
The Ward LaFrance organization has for twenty-five years devoted itself to the needs of those with *special* requirements, which cannot adequately be met by equipment designed for general-purpose applications.

If your motor transportation problems are different and difficult — if they involve special operations or unusual loads, remember this:

Whether your operation is fire protection or multi-stop retail delivery, you should investigate the advantages of special trucks now. Today Ward LaFrance is turning out special Army trucks with heartening speed—but its engineers will glady consult with you on your post-war needs, and cooperate with you in every possible way.

Refrigeration Truck

750 G.P.M. Pumper



Special Heavy-duty Load Chassis

Wholesale Bakery Truck

Heavy Wrecker M1

Municipal Wrecker Truck

Ward LaFrance

TRUCK DIVISION ★ GREAT AMERICAN INDUSTRIES ★ ELMIRA, NEW YORK

© 1943 G.A.I., Inc., Meriden, Conn.

Make your snow plowing SAFE!

Be prepared for snow and sleet storms. Snow plows can be a public menace. Hidden by swirling snow, any of them could suddenly loom up too late for an approaching vehicle to swerve aside.

"Play safe rather than sorry." Equip each plow with KEYSTONE SNOW PLOW LIGHTS. Ahead and to the rear they flash a big warning in red, blue or amber, STOP. (Letters are 2½ inches high) that instantly attracts attention and can be seen through the swirling snow. These 80 times-per-minute flashes warn in time to avoid accidents. They protect the public—your men—your equipment. They're used by many states, cities, counties, towns, parks and bridges.

Investigate NOW, while immediate delivery can still be made.

KEYSTONE LIGHTS
FLASH TO FRONT & REAR

AUTO GEAR & PARTS CO.

1410 WEST HUNTING PARK AVENUE, PHILADELPHIA, PA.

"SURE we're stuck, but they are breaking the drift through with a Snogo. We'll get there tonight all right. You won't have to shut down."

★ ★ ★

ALL over the nation, plants, large and small, plants in the city, plants far off in the country, contributing to the war effort are wondering if the goods are coming through. Materials from here, a small part for an assembly from there, all moving on a schedule so close that should delivery fail, partial shutdown somewhere along the line is almost inevitable.

Lots of small plants and lots of communities are going to be thankful this year for Snogo. Snogos are going to break open many drifts for the movement of quantities of materials. Snogos are going to keep many production roads open.

★ ★ ★

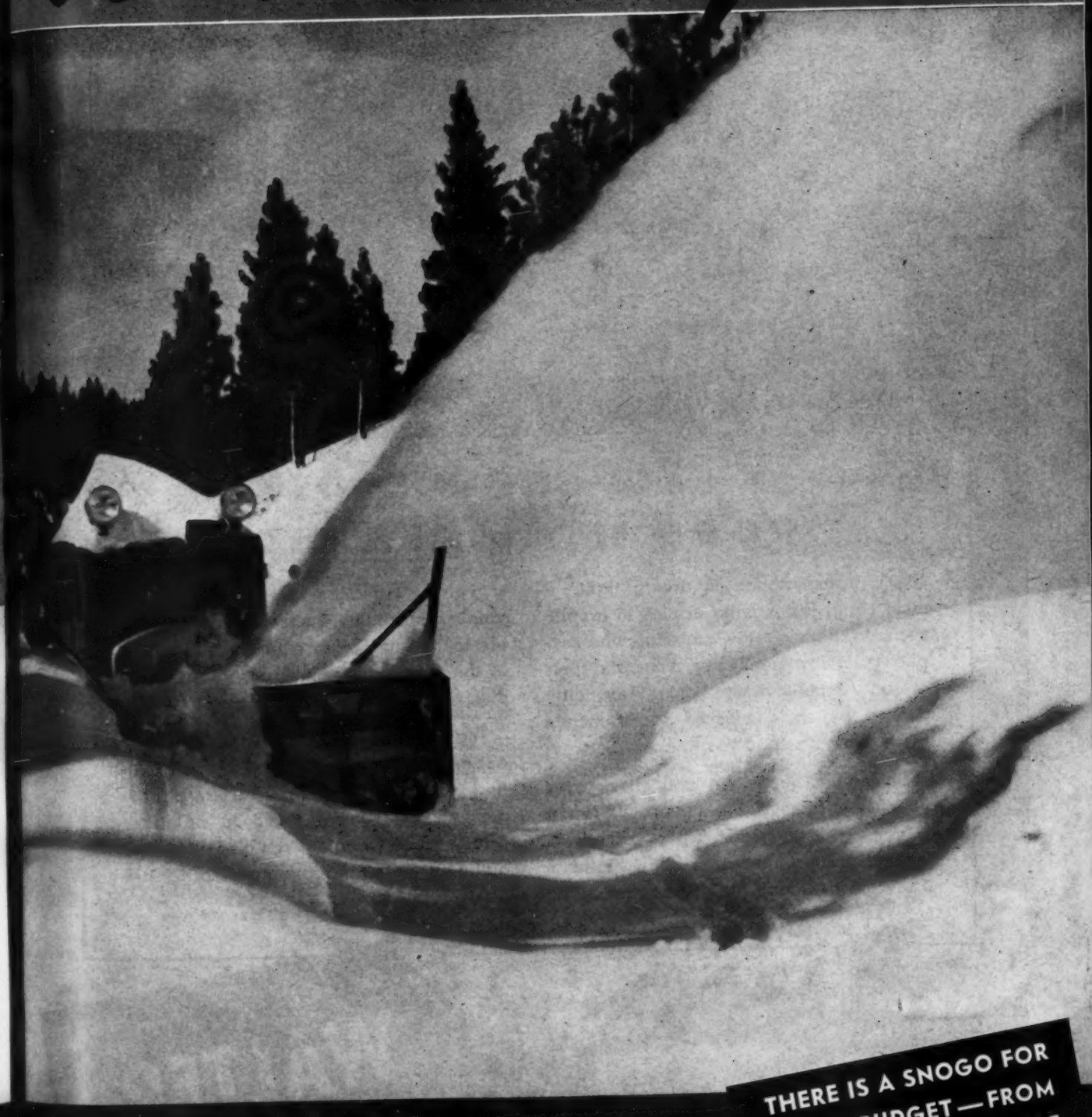
Someday a peace treaty is going to be signed and there will be tires and gasoline again. Then winter motor transport and winter motoring are going to be more of a part of everyday life than ever before. Winter traffic will be heavy and the driving public will require and demand real snow clearance—winter roads as open and safe as summer roads. Rural communities are entitled to and will want the better business that always comes with clear highways; and rural residents will want and ask for the safety and security that can only come with cleared roads.

Then it is going to be up to highway departments and county commissioners to deliver. Against that time let us tell you what Snogo means in winter highway safety.

KLAUER MANUFACTURING COMPANY, Dubuque, Iowa

Keep 'em Rolling

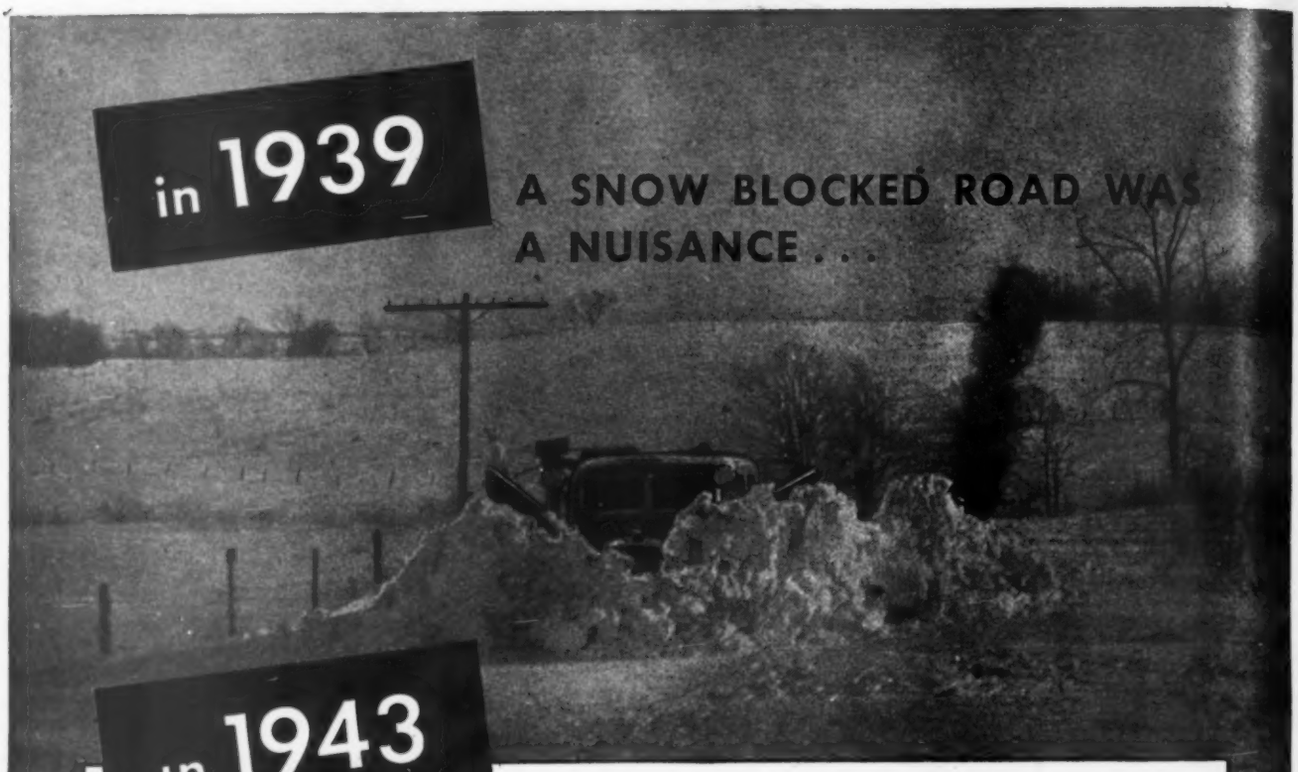
...there tonight!



THERE IS A SNOGO FOR EVERY BUDGET—FROM A 1½ TON TO THE LARGEST FOUR WHEEL DRIVE TYPE OF TRUCK

SNOGO

For Complete Snow Removal



in 1943

A SNOW BLOCKED ROAD IS A CALAMITY!

1943's transportation is drawn tight. It must equip fast-moving armies in a split-second schedule. Raw materials and supplies must flow to industry. Food and fuels are on a hand-to-mouth basis. Any delay caused by snow blocked roads means acute loss. It's up to you to clear the way.

Remember this when you check over your snow removal equipment. Be ready to cope with the worst winter conditions, by equipping with Walter Snow Fighters. They plow through the deepest drifts and travel icy surfaces where other trucks vainly churn their wheels — they work faster than any other equipment, because of the great power-plus-traction of the exclusive Walter Four Point Positive Drive.

Walter Snow Fighters are specially designed and built to withstand the gruelling work of snow removal and have mechanical features found in no other truck. Write today for detailed literature outlining the many advantages of Walter Snow Fighters.

. . . order WALTER SNOW FIGHTERS Now!

WALTER MOTOR TRUCK CO., 1001-19 IRVING AVE, RIDGEWOOD, QUEENS, L. I., N. Y.

—AND STILL AVAILABLE TO YOU!

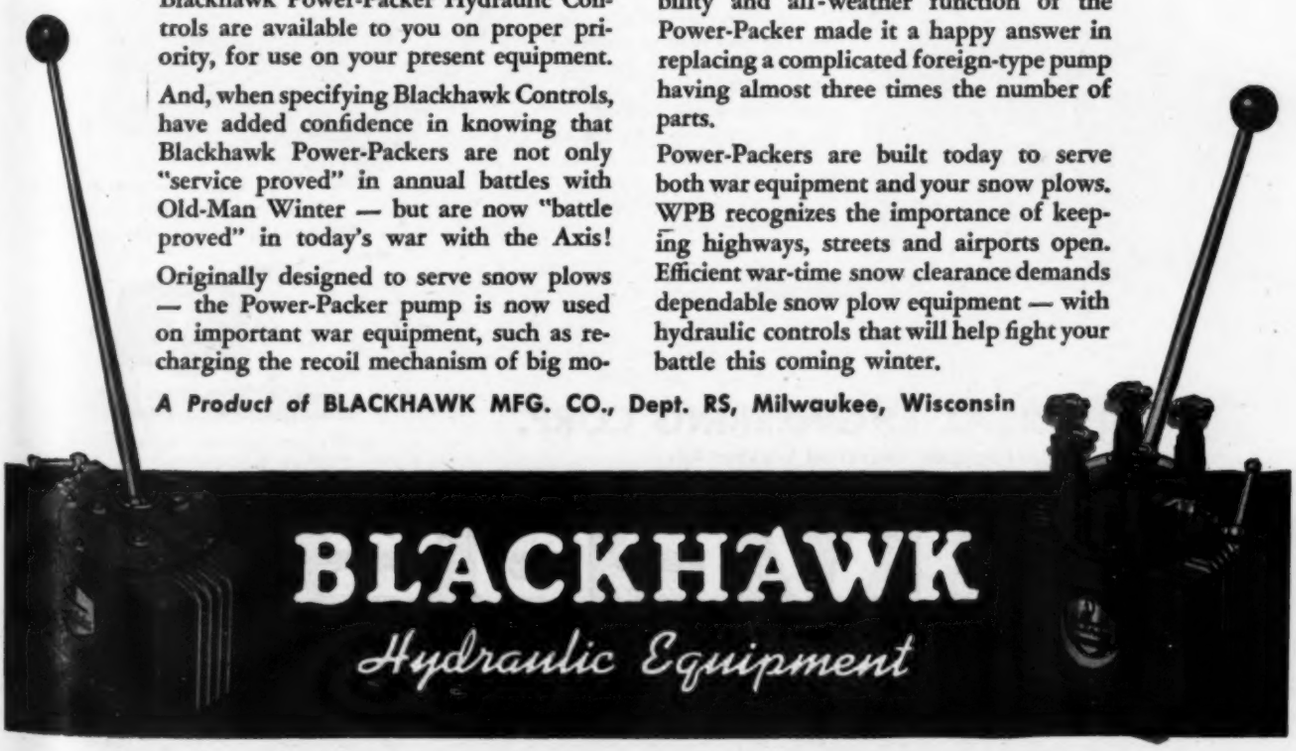
GOOD NEWS for snow plow operators! Blackhawk Power-Packer Hydraulic Controls are available to you on proper priority, for use on your present equipment.

And, when specifying Blackhawk Controls, have added confidence in knowing that Blackhawk Power-Packers are not only "service proved" in annual battles with Old-Man Winter — but are now "battle proved" in today's war with the Axis!

Originally designed to serve snow plows — the Power-Packer pump is now used on important war equipment, such as recharging the recoil mechanism of big mobile guns. The speed, simplicity, dependability and all-weather function of the Power-Packer made it a happy answer in replacing a complicated foreign-type pump having almost three times the number of parts.

Power-Packers are built today to serve both war equipment and your snow plows. WPB recognizes the importance of keeping highways, streets and airports open. Efficient war-time snow clearance demands dependable snow plow equipment — with hydraulic controls that will help fight your battle this coming winter.

A Product of **BLACKHAWK MFG. CO., Dept. RS, Milwaukee, Wisconsin**



The Care and Feeding of Rock Crushers

No. 4 of a series of advertisements published in the interests of national economy and to aid those users of crushing equipment unable to secure new units during the emergency.

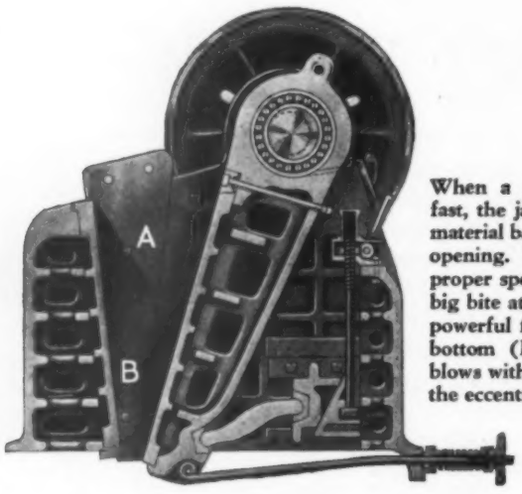
What Operating Speed for Maximum Output?

As with a gasoline or diesel engine, there is an ideal speed at which crushers will provide maximum efficiency. Operating below that range may provide increased crushing efficiency at the expense of volume; and operating above that range may provide decreased crushing efficiency and decreased volume, because of choking and premature wear of the jaws and other parts.

Crushers should be operated within the range of speeds indicated on the name plate. Universal engineers are familiar with all sorts of rock, ores and slags and are glad to be consulted where special cases indicate higher or lower than standard operating speeds.

When a crusher is run too fast it will not grip the rock. This results in slippage and causes rapid wear of the jaws. Do not operate on the theory that every revolution of the eccentric shaft gives a crushing blow and, therefore, increased capacity.

There is a peak speed which, when exceeded, causes decreased production. Therefore, the increased speed over the peak is wasteful and wears out equipment much faster. *At high speeds, rock floats in the crusher and jaws cannot grip it readily.*



When a crusher is run too fast, the jaws tend to squeeze material back up into the feed opening. When run at the proper speed, the jaws take a big bite at the top (A) and a powerful finishing bite at the bottom (B) — two crushing blows with each revolution of the eccentric shaft.

The "Overhead Eccentric" crushing principle, pioneered by Universal, gives maximum production.

We've earned this WAR BOND buyer's flag to help keep "Old Glory" flying!

UNIVERSAL ENGINEERING CORP.
Formerly Universal Crusher Co.
631 C Ave. West — Cedar Rapids, Iowa

UNIVERSAL
CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

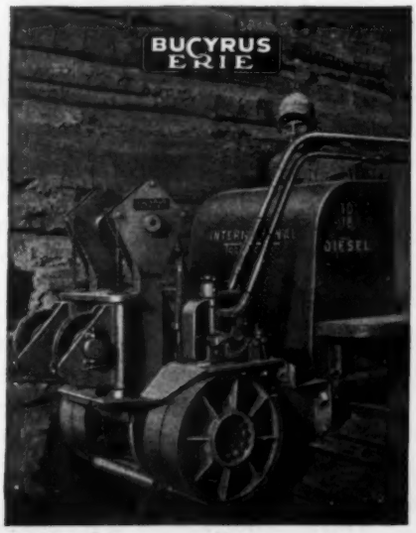
How To Get TOP WINCH PERFORMANCE

On Your WARTIME DIRT-MOVING JOBS

The best tractor, the best tractor equipment can't move dirt efficiently if winch trouble piles up lost time. Nor will the best winch stand up under the punishment of high-speed 3-shift wartime service if maintenance is neglected. Bucyrus-Erie Power Control Units are built for long life and hard usage. Here are a few hints on their proper care:

1. Clutch bands receive more wear than the brake bands. Interchange them occasionally to obtain maximum life from the linings.
2. Check the adjustment of clutch and brake bands daily. Keep linings clean.
3. Disassemble sheaves and clean them occasionally to prolong life of the bearings and other parts.
4. Check the oil level in the gear case often, keep it clean and free from dirt and cuttings.
5. If oil seals are leaking, try to tighten them by cutting and shortening the springs inside the seals.
6. Lubricate regularly using good grade lubricants and follow the manufacturer's instructions carefully.

Keep your tractor equipment producing . . . your nearest International TracTracTor Distributor will be glad to advise you on proper maintenance and lubrication.



P 139

BUCYRUS ERIE TRACTOR EQUIPMENT

SEE YOUR INTERNATIONAL TRACTRACTOR DISTRIBUTOR

PREVIEW OF TOMORROW'S POWER

IF you want a glimpse of how tomorrow's hard jobs will be done, look at what is doing the tough war jobs today — such jobs as building airfields in the jungle.

Look in tanks and trucks, in landing barges and patrol vessels, in tractors and auxiliaries. You'll find General Motors Diesel Engines packing them with power.

This grueling service is emphasizing the virtues of GM Diesels—highlighting their ruggedness—showing how little fuel they use, and low-cost fuel at that.

With the war won, our expanded facilities will be turned to peacetime needs, and these engines will be available for many applications where America will need dependable, economical power.

Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.

BACK THE ATTACK—WITH WAR BONDS

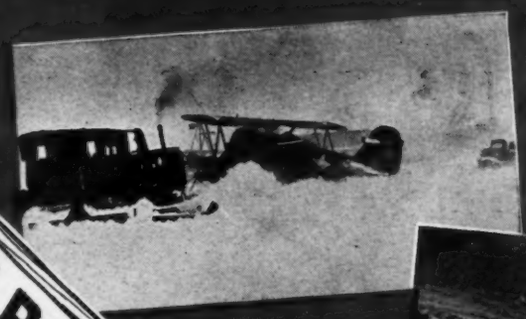
GM
GENERAL MOTORS
DIESEL POWER

ENGINES..... 15 to 250 H.P.....DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES...150 to 2000 H.P...CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES.....ELECTRO-MOTIVE DIVISION, La Grange, Ill.

BAKER BULLDOZERS



The Road to Victory starts in the U. S. A. and leads to Tokio via Berlin. Baker Hydraulic Bulldozers and Gradebuilders are working on the Road to Victory—shortening it, smoothing out sharp curves, cutting down steep grades, eliminating detours. The fast, positive, direct lift and full down pressure on the blade, the absence of cables, clutches and brakes, thus minimizing maintenance costs, and the speed of moldboard change-over from bulldozer to gradebuilder are all contributing to rapid completion—on schedule—of the Victory Road.

Awarded the Army-Navy "E" for proficiency in production.

THE BAKER MFG. CO.

506 Stanford Avenue **Springfield, Illinois**

BAKER *The Modern Tractor Equipment Line for*
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE

THOUSANDS OF MILES FROM ANY FRONT BUT WAR HAS RAVAGED *Highway A!*

Much highway maintenance and construction must mark time for the duration. Available manpower, material and equipment can be utilized only for maintenance of roads that serve as transportation arteries between military and industrial centers.

Time, weather and the neglect enforced by war will exact their penalties on many fine highways. War's end will begin a nation-wide job of road rehabilitation.

Cleaver-Brooks Tank Car Heaters and Boosters will be of vital importance in setting and keeping a fast pace in road reconstruction and building... There's no waiting for road oils or bituminous materials to be brought to application temperatures — when there is a Cleaver-Brooks Tank Car Heater or Booster on the job.

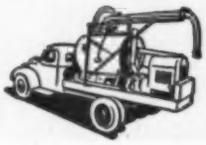
Haul it to the unloading siding by truck or passenger car. Hot, dry steam will flow to the car heating coils in 25 minutes — with every foot of the car coils constantly working because of the exclusive Cleaver-Brooks dry-coil method of condensate return. You do away with the "water wagon" problem as every drop of condensate is returned to the tank car heater under pressure. High-speed, economical performance is due to the original and exclusive Cleaver-Brooks four-pass down-draft flue travel and integral burner construction plus the positive dry-coil method of condensate return . . . Cleaver-Brooks Tank Car Heaters are built in two and three tank car sizes—Portable Pumping Boosters in two capacity sizes, with truck mounting or 4-wheel trailer . . . *Write for complete information.*

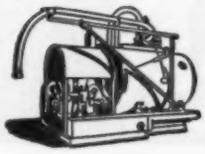
CLEAVER-BROOKS COMPANY, 5106 N. 33rd Street, Milwaukee 9, Wisconsin

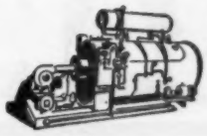
Truck-mounted Cleaver-Brooks Portable Pumping Booster used in airport, flight strip and road construction.

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS

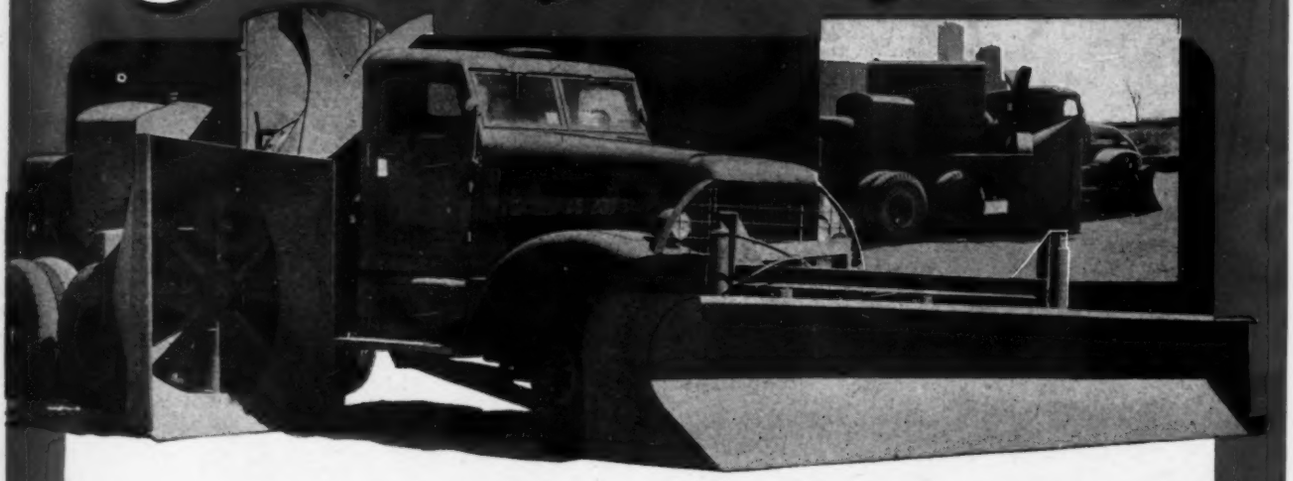






AMERICA'S MOST VERSATILE

Snow Removal Unit



BROS ROTARY WIDENER

for Highway and Airport Operation!

Swiftly establishing itself in popularity, because it does more snow jobs better and faster, the Bros Rotary Widener is a versatile snow removing machine. Designed for high speed handling of snow, it does the needed jobs for highway and airport maintenance with a saving in time, labor and expense.

On the Highways: The Bros Rotary Widener does your most essential job, which is immediate and complete removal of freshly fallen snow from the road, so that you have plenty of space to work the next storm. During cold weather, when the truck can travel safely on the shoulder of the highway, it permits you to clear away the drifts 40 inches from the edge of the shoulder. This gives you insurance against wet, soggy road shoulders when the spring thaw begins. You get sharp, incisive cleaning, right down to the surface with the Bros Rotary Widener.

On Airports: You can start with the storm and keep up with it. The Bros Rotary Widener clears a strip up to 18 feet wide with a single pass, using a special long one-way mouldboard plow, and at exceptionally high speeds. It is the most versatile snow unit for airport maintenance.

Features: The driver has complete vision at all times. The rotary unit sets behind the cab and snow is thrown behind the driver. The chute is reversible so that snow can be discharged to either side of the road or runway. The plow throws a constant, concentrated stream of snow—making it possible to obtain good results even in high winds. The rotary unit may be lifted hydraulically, providing adequate ground clearance for safe, speedy travelling. The Bros Rotary Widener is a complete self-contained unit and may be removed easily and quickly from the truck. The front plow may be dropped at any time, making the truck instantly available for other front end equipment. *Complete details on the Bros Rotary Widener—America's most versatile snow removal unit—will be sent upon request.*

ROAD MACHINERY DIVISION

WM. BROS BOILER & MFG. CO.

Minneapolis, Minnesota

BROS *Rotary* **WIDENER**

SNOW PLOWS ALL TYPES | BULLDOZERS AND TRAILBUILDERS | TANK CAR HEATERS | CIRCULATORS | TAMPING ROLLERS | WOBBLE-WHEEL ROLLERS

DRILLING *to take out the toe!*

Drilling a snake hole with the DR30

CLEVELAND DR30 Wagon Drills, in addition to having plenty of speed and stamina, are also remarkably maneuverable. They drill readily in any position and at any angle—straight down, flat, breast high, higher than your head, or within 4″ of ground level—even straight up when necessary.

The DR30 has a recoil device to increase cutting speed. The forward leg point steadies the drill. Other important features include a handy centralizer to keep the steel from "walking" while starting a hole. Also a double-screw jack for moving the U-bar. With a feed capacity of more than 8 feet, the DR30 handles depths to 25 feet and more.

Bulletin 132, sent upon request, explains why the DR30 is the most popular wagon drill ever built.

BRANCH OFFICES

Birmingham, Ala.	Denver, Colo.	Philadelphia, Pa.
Berkeley, Calif.	Detroit, Mich.	Pittsburgh, Pa.
Boston, Mass.	El Paso, Texas	Richmond, Va.
Buffalo, N. Y.	Ironwood, Mich.	Salt Lake City, Utah
Butte, Mont.	Knoxville, Tenn.	St. Louis, Mo.
Chicago, Ill.	Lexington, Ky.	Victor, Colo.
Cincinnati, Ohio	Los Angeles, Calif.	Wallace, Idaho
Dallas, Texas	Milwaukee, Wis.	Washington, D. C.
	New York, N. Y.	

CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Whitehall Machine & Tools, Ltd., Galt, Ontario

BUY U. S. WAR BONDS AND STAMPS

THE CLEVELAND ROCK DRILL COMPANY

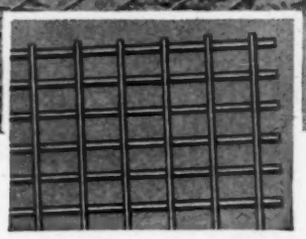
Division of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL" • CLEVELAND 5, OHIO

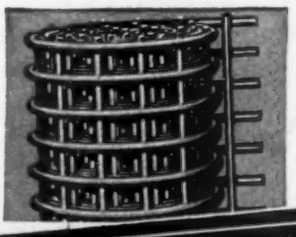
LEADERS IN DRILLING EQUIPMENT

MARIONS
OFF TO WAR . . . ! !
Carloads of MARIONS roll out of the company's yard daily to unrevealed destinations. They are heading for active duty on many fronts and under all kinds of operating conditions. In Africa, India, Britain, Alaska, Iceland and the South Pacific, MARIONS are giving a good account of themselves . . . a lasting tribute to proven performance.
The Marion cranes shown above packed for shipment to seaboard and overseas service.
FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS
THE MARION
STEAM SHOVEL COMPANY, MARION, OHIO, U. S. A.
SHOVELS • DRAGLINES • CRANES • CLAMSHELLS • WALKERS
PULL-SHOVELS • COAL LOADERS • STRIPPING SHOVELS
GAS • DIESEL • ELECTRIC (From ¾ Cu. Yd. to 35 Cu. Yds.)

For highways built with an eye to the future . . .



IN SHEETS . . . OR IN ROLLS



CONCRETE pavement slabs reinforced with the required amount of Wire Fabric, properly designed and constructed with adequate joints, will stand a practically unlimited number of stress repetitions without concrete failure or fatigue. The use of Wire Fabric is sound engineering. That's why reinforced concrete has been so widely accepted for construction of so many long-lasting roads and streets.

America will need many new highways in the period ahead. And to make them durable, with low maintenance costs, make a note to specify Wire Fabric reinforced concrete pavements.

AMERICAN STEEL & WIRE COMPANY

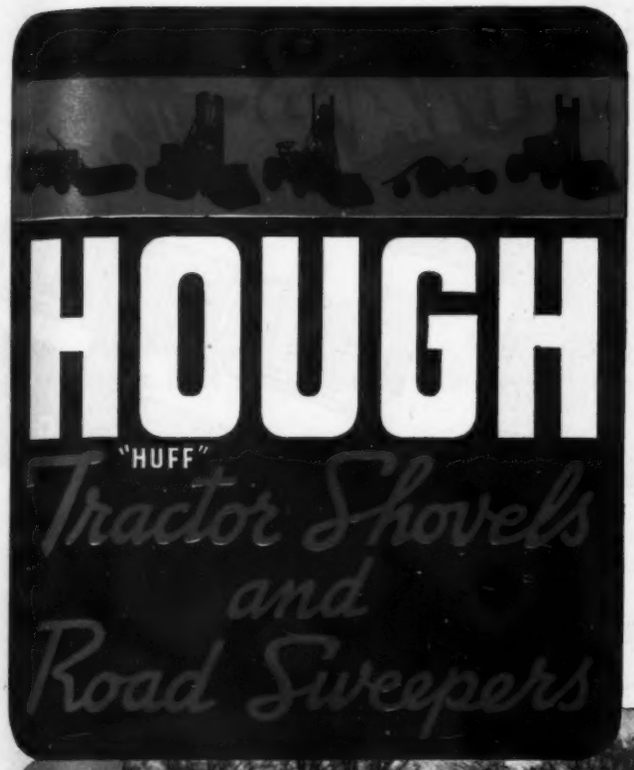
Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

USS

AMERICAN ELECTRIC WELDED WIRE FABRIC

UNITED STATES STEEL



HOUGH

"HUFF"

Tractor Shovels and Road Sweepers

Not Ready to Retire!

"WM" Tractors are out of production, so prospective users of Hough Models "WM" and "WMX" Shovels must wait until the manufacture of this class of machinery is again permissible. Meanwhile, owners of this equipment should take full advantage of these profit factors:

(1) Make broader use of your Hough equipment on new and unusual applications.

(2) Prolong the useful life of your Hough equipment by proper maintenance and operation. The following suggestions will prove helpful.

Shorten snap chains **to increase dumping height on free-dumping material . . .** ***Use special width buckets*** **for rehandling and light materials loading (your dealer has the details) . . .** ***Hardface bucket cutting edges*** **for maximum bucket life . . .** ***Keep cutting edges sharp*** **for bigger loads and faster loading . . .** ***Use counterweights*** **to provide increased load capacity on front end . . .** ***Keep hydraulic system clean . . . Use only SAE 10 oil*** **(U. S. Engineers OE10) . . .** ***Lay out your job properly*** **to do as little turning as possible for maximum crawler life . . .** ***Don't turn in soft-going;*** **run straight across the job.**

Can we help you with your operating and maintenance problems?

Practical Extra Uses for Hough Shovels

For **bank and slope cutting—*For*** **boosting wagon scrapers and trucks—*For*** **charging concrete mixers, asphalt plants and black topping machines—*For*** **cleaning up inside of forms, trenches, pits and basements—*For*** **gondola car loading, using ramp—*For*** **setting pipe, culverts and lighting standards—*For*** **pulling poles and shoring. *Of course, the tractor is available for all normal uses.***

THE FRANK G. HOUGH CO.

• Libertyville, Illinois •

REMODELING THE MAP with Cedarapids

Built by IOWA

ALASKA

IDAHO

OREGON

ARIZONA

CALIFORNIA

MEXICO

Proved from ALASKA to MEXICO by MORRISON-KNUDSEN CO.

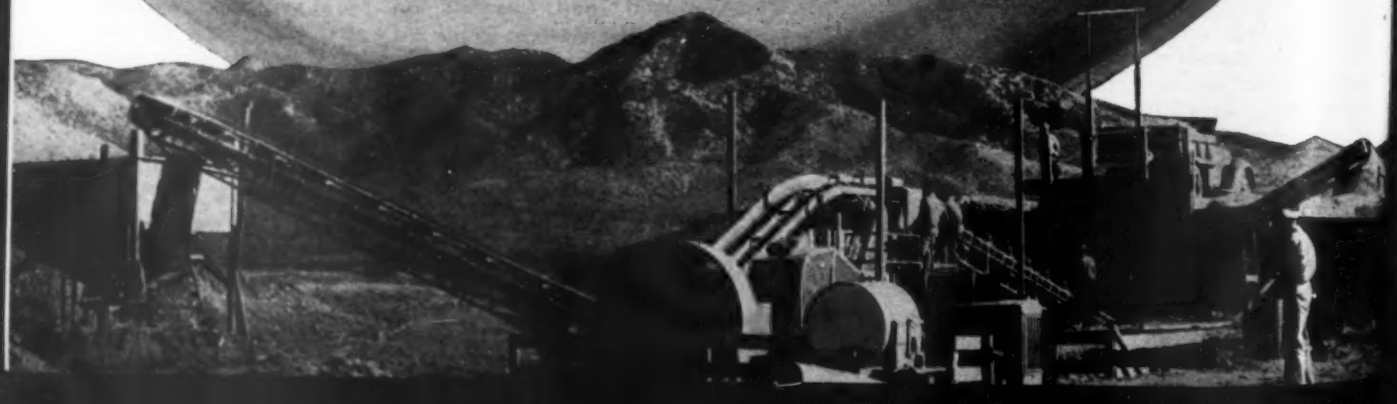
DOWN America's long Pacific Coast Line the map is changing. War Birds Nests—landing fields that were never there before mark strategic locations for America's protection.

War time construction is high pressure construction — the toughest possible test on man and machine. It is significant that Morrison-Knudsen of Boise, Idaho, a firm that bases its purchase of machinery on the job to be done, has bought Cedarapids Portable Crushing Plants again and again. From far flung Alaska to the plains of Mexico Morrison-Knudsen has been building war birds nests with Cedarapids plants. And Morrison-Knudsen is just one of the many well-known outfits that have been getting big output out of Cedarapids plants and who have bought more than one Cedarapids portable crushing plant.

Remember a repeat order buyer is a satisfied buyer. Tomorrow when peace makes the advancement and expansion of your own business possible, remember that Iowa Cedarapids plants are both war and peace time tested by the Nation's leading contractors. Come to Headquarters for aggregate producing equipment.

IOWA MANUFACTURING COMPANY

Cedar Rapids, Iowa



Can you get

each of your employes to

BUY AN EXTRA $100 BOND

in September?

That's the problem.

That's the job of the Third War Loan.

The objective is to raise fifteen billion dollars. No one ever set out to raise fifteen billion dollars at one time before in all the history of the world. To raise that kind of money, you have to go where the money is . . . the idle money.

72% of all the *idle* money is estimated to be in the hands of people who work for wages.

They are the employes on your *payroll* and the employes on other business men's *payrolls*.

You are the quickest, most direct route to those millions of men and women.

You know them.

You have access to them.

They are *your* particular *prospects*.

If you can get each of them to buy at least one extra $100 war bond (price: $75), in addition to their regular payroll deduction purchases, the Third War Loan will be a success.

We are listing below some of the things you can do to help sell an extra bond to each one.

Will you do them?

HERE'S HOW TO DO IT!

This brief outline was prepared expressly for your use by a nationally-known firm which recently directed a successful war bond selling drive among a large group of Koppers employes.

You have undoubtedly served on some money-raising campaign in your city . . . for your favorite hospital, or community fund, or Red Cross.

You know how those campaigns are organized.

Organize one in your own plant or plants for the Third War Loan.

1. Appoint a campaign committee, or have the labor-management committee appoint one.

2. Head it up with a chairman who is aggressive and a go-getter.

3. Have committees set up for each shop or each department. Organize them as teams, to compete with each other. Americans love competition . . . we love to make a game of our work. Appoint leaders for all committees and give them military titles.

4. Appoint a campaign manager who can devote full time to the campaign until you reach your goal.

5. Start with a big rally. Get your local Army or Navy office to send officers and men to take part in the rally, or have a returned war hero appear, for morale purposes. If you are working on war work make some special shipment as part of that rally.

6. Put up exhibits and posters around the plant which you can get from your local War Loan headquarters.

7. Have a bulletin board on which you can post daily the *percentage* of employes who have signed up in each department or on each team.

8. Have some newspaper publicity about what you are doing. It will encourage your people and will help the company, too. Tell the publicity director of your local War Bond campaign what you are doing.

9. Where employes are unable to afford a $75 expenditure for a $100 war bond, encourage them and members of their families to sell war stamps to their friends and neighbors and credit these sales against the team total.

10. End the campaign with a rally and honors or prizes for the biggest producers or hardest workers.

KOPPERS COMPANY AND AFFILIATES, PITTSBURGH, PA.

KOPPERS

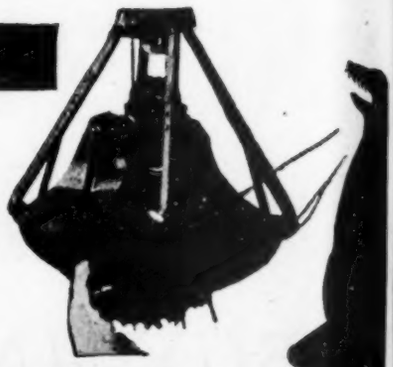
THE INDUSTRY THAT SERVES ALL INDUSTRY

INCOMPARABLE

Ability to stand up under the toughest service ever encountered is characteristic of Owen Buckets.

Exclusive features—scientific designing—protected working parts — efficient lubrication — combine to assure the exceptionally long life for which these buckets are noted

The OWEN BUCKET Co.
Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.



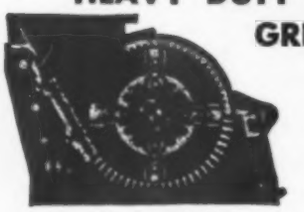
OWEN BUCKETS

A MOUTHFUL AT EVERY BITE

GRUENDLER CRAFTSMANSHIP
Employed by U.S.A. in the WAR EFFORT

HEAVY DUTY CRUSHING and GRINDING EQUIPMENT

for—Heavy Ores, Chemicals, Bauxite and ROCK Products



Gruendler Features:
MOVING TRACK BREAKER PLATES
For Wet, Sticky Materials.
TRAMP METAL CATCHER
Full Protection to Crusher.

Developed by Engineers who have made a Life Study of the Hammer Mill Principle for Material Reduction keeping in step with new features to meet the demands for greater efficiency and speed.

Write for our Bulletin on Large Capacity Hammermills

GRUENDLER CRUSHER & PULVERIZER CO.
PLANT and MAIN OFFICE—2915-17 N. MARKET • ST. LOUIS, MO.

UNTIL THE LAST GERMAN CRIES "KAMERAD"

the U. S. Engineers need BYERS cranes more than civilians do... and the Engineers are getting them

In the meantime, owners of current and older models of Byers shovels and cranes may depend on Byers Parts Service to help them keep present equipment working steadily and satisfactorily.

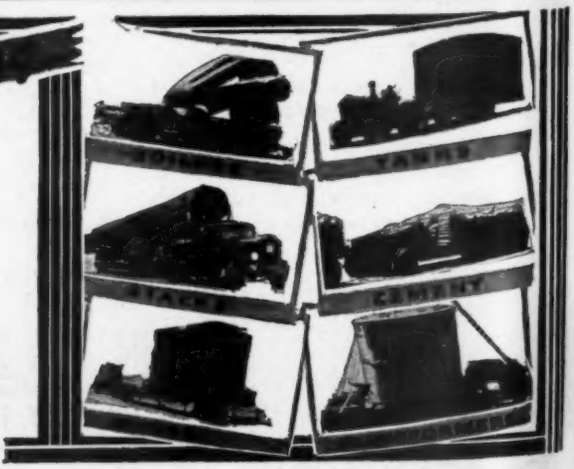
WHEN THE WAR IS WON

Byers will offer you new, improved, faster mobile cranes and shovels for peacetime jobs.

BYERS CRANES AND SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

Serving the "FACTORY FRONT" too!

ROGERS TRAILERS



ROGERS BROTHERS CORP., ALBION, PENNA.

from FLYING

American Roads in Europe

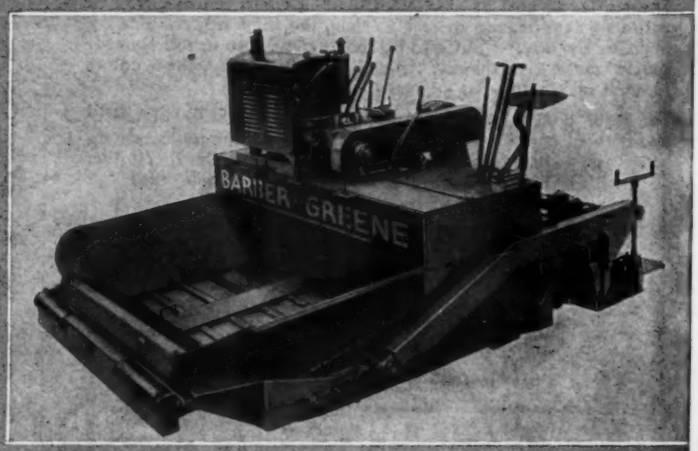
THIS Martin B-26 is landing on an American road "somewhere" in Europe. These American roads are laid side by side in Europe. They are wide, long runways that get our heavily laden bombers off safely and welcome them back smoothly.

These runways are built by American road machines, too, in the driving hands of the U. S. Engineer Corps. They include Barber-Greene asphalt mixers, dryers and bucket loaders—Barber-Greene Asphalt Finishers that lay a ten or twelve foot compacted mat. These B-G Finishers provide quick construction and immediate use of these vitally needed airfields.

This is the equipment that will build and repair our postwar roads and streets faster and at less cost per mile or block.

Now is the time to investigate the Barber-Greene line of equipment—some Barber-Greenes are available today for high rated projects. Get the facts *NOW* for the postwar period that these machines are bringing ever closer. Write to Bituminous Equipment Sales, Barber-Greene Company, Aurora, Illinois, U. S. A.

● Below is the Barber-Greene Asphalt Finisher that thoroughly compacts material in place and automatically levels out uneven surfaces. This is one of the units in the Barber-Greene Army Asphalt Plant.



ARMY E NAVY

Awarded August, 1942

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REFLECTIVE SIGN SHEETING

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You will find "SCOTCHLITE" the ideal material to use where efficiency, economy and dependability are the No. 1 requirements on sign reflectorizing jobs. This reflective sheeting is adaptable to all types of signs, markers, guard rails, bridges, underpass approaches, etc. Its application is easy and time-saving.

The moderate cost of "SCOTCHLITE" permits reflectorizing of entire sign surfaces so as to give them the same appearance by night as by day. "SCOTCHLITE" is available in roll form or special cut-to-size sheets . . . in silver, white and yellow colors to meet all sign needs.

For your convenience in making a test of "SCOTCHLITE" under local conditions, we have sample signs already made up at reasonable cost. Why not write for further details and information on this sample offer.

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MINNESOTA MINING & MANUFACTURING CO.

Saint Paul 6, Minnesota

★ BUY MORE WAR BONDS ★

Gentlemen: R&S 943

☐ Kindly send further information on your sample offer.

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ABRASIVE PAPER and CLOTH PRODUCTS
"SCOTCH" TAPES
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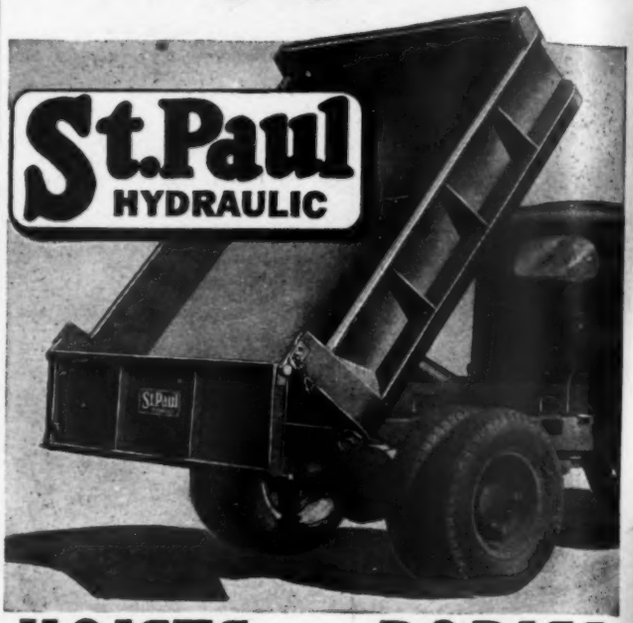
FOR 30 YEARS



HOISTS and BODIES

Outstanding Performance, Dependability, Long Life

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DOUBLE LIFTING ARM TYPE HOIST

The St.Paul Hydraulic Hoist Co., established in 1912, is the original manufacturer of hydraulic hoists and steel dump bodies for motor trucks, and since that time has developed the finest dumping units obtainable from any manufacturer.

There are St.Paul hoist models and body types available for every size truck and dumping-hauling requirement. Above left is illustrated the popular Direct Lift Type hoist. (below) The Double Lifting Arm Type hoist.

Write for illustrated literature giving details and special features.

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ST. PAUL HYDRAULIC HOIST COMPANY

2207 UNIVERSITY AVENUE, S. E.

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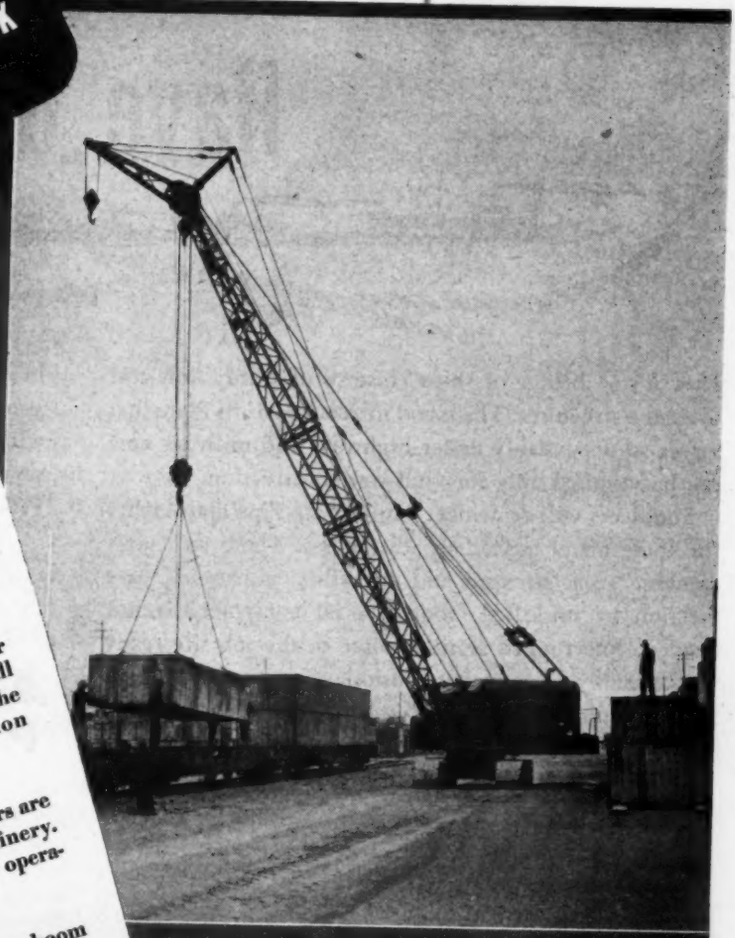
WORKING for VICTORY

LIMA CRANES HAVE WHAT IT TAKES TO SPEED UP WAR WORK 6 REASONS WHY –

LIMA LIFTING CRANE HELPING TO SPEED UP THE HANDLING OF VITAL WAR SUPPLIES DESTINED FOR SOME FOREIGN BATTLE FRONT.



1 INDEPENDENT CLUTCHES—LIMA cranes can travel and raise or lower the boom at the same time, or lower the and travel at the same time, or swing, hoist operations simultaneously. Imagine the saving in time and the convenience of such a feature.

2 LARGE DIAMETER DRUMS—Drums are of extra large diameter and are of sufficient width to carry the maximum amount of cable for ordinary length booms. Big drums afford longer cable life.

3 ANTI-FRICTION BEARINGS—To further increase the efficiency of LIMA cranes, all important bearing points, including the drums are equipped with anti-friction bearings.

4 HELICAL CUT GEARS—Helical gears are used throughout the main machinery. This LIMA feature assures quiet operation and long life.

5 FAST, LIVE BOOM HOIST—The boom hoist is so designed that absolute safety is assured when raising or lowering the boom. It is independent of all other motions.

6 EASE OF OPERATION—The clutches and brakes are designed for smooth, easy operation. The clutches are the inside expanding type. The bands are extra wide with the maximum of clutch area, thus affording longer life to the lining and freedom from constant adjustment.

Send for free descriptive bulletins

Buy War Bonds and Stamps

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SHOVEL AND CRANE DIVISION
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LIMA CRANES SHOVELS DRAGLINES

SHOVELS ¾ YD. TO 3½ YDS. CRANES 13 TONS TO 65 TONS
DRAGLINES - VARIABLE

MULTI PLATE BRIDGES Have Gone to Sea

Now it's a "bridge of ships" instead of sturdy, low-cost drainage structures. The metal in ARMCO Multi Plate that serves so dependably under highways and railways now can be supplied only for vital war construction.

Engineers will remember Multi Plate Pipe and Arches for their many peacetime advantages. These structures combine great strength and durability with quick, easy erection by unskilled labor. Special equipment is not needed. The rugged sections come to the job site ready for assembly. An average installation requires only a few days and low-cost, trouble-free service is assured.

It will pay you well to keep sturdy ARMCO Multi Plate in mind even though you may not be able to get it for your immediate construction needs. After the war it again will be available for bridges, stream enclosures, large sewers and special drainage structures. Armco Drainage Products Association 205 Curtis St., Middletown, Ohio.

MULTI ARMCO PLATE

ARMCO MULTI PLATE PIPE AND ARCHES

How to Reduce Lost Time in Wet Weather —With LeTourneau Equipment

Prepare for Rain — Get Back to Work Sooner — Maintain Production Schedules by Using These Simple Suggestions

Does wet weather put a "Job Closed" sign on your project? Do long waits for dry conditions throw your production schedules out of line? You can reduce this lost time and keep your LeTourneau Carryall Scrapers and Dozers producing during wet seasons by following the methods used by some of the country's largest and most successful contractors.

Eliminate Rain-Catching Ruts

Keep cuts and haul roads smooth to eliminate ruts, large holes and pockets that catch and hold rain water. This can be done easily, without consuming extra time or using specialized equipment, by occasionally dragging the Carryall blade on the return trip from the fill. Keeping cuts and haul roads smooth not only pays dividends in wet conditions but also helps increase production during normal operations by allowing faster hauling speeds and reducing equipment maintenance.

Don't Root in Wet Conditions

You may be using a Rooter to help you get bigger loads quicker, but if it looks like rain or you're working in wet conditions do not root . . . keep the cut as solid as possible. Loose, rooted material soaks up water. You'll maintain better production by getting smaller loads in a solid cut than no loads at all because the job is bogged down.

Watch Drainage of Cut and Fill

The cut should be kept well crowned to give best drainage. If the rains are quite heavy, it's good practice to cut a drainage ditch with reasonable fall on each side of the cut. This is easily done with a pass or two by a Dozer along the edges of the cut at the end of a shift. It will deepen the drainage area and keep the water from soaking into the center of the cut.

Keep the fill as solid as possible. Spread loads in thin, even layers and change the path of travel on the fill to give overall compaction. In normal conditions, it's best to build the fill high on the shoulders and low in the center. In wet conditions, keep the fill about level and at the end of a shift crown it a little and cut a few drainage spots to take care of the water in case it rains.

If the cut and fill are properly prepared before it rains, you will save a lot of time and money by getting back on the job sooner.

What to Do After Rain

In starting back to work after a heavy rain, it's advisable to put a Dozer or Carryall to work a few hours ahead of the other equipment to skim the mud off the cut and haul road. The first two or three loads of dry dirt should be spread on the fill in heavy layers. This will give you a good base for thin spreads later on.

See Your LeTourneau-"Caterpillar" Dealer

Take advantage of the Dozer and Carryall's ability to work in mud or muck. Get back to work sooner after wet weather . . . keep your project going for Victory. If parts and repairs are necessary see your LeTourneau-"Caterpillar" distributor. He's equipped to handle your every service need with highly-trained men, field and shop repair facilities. Call on him TODAY.

LETOURNEAU

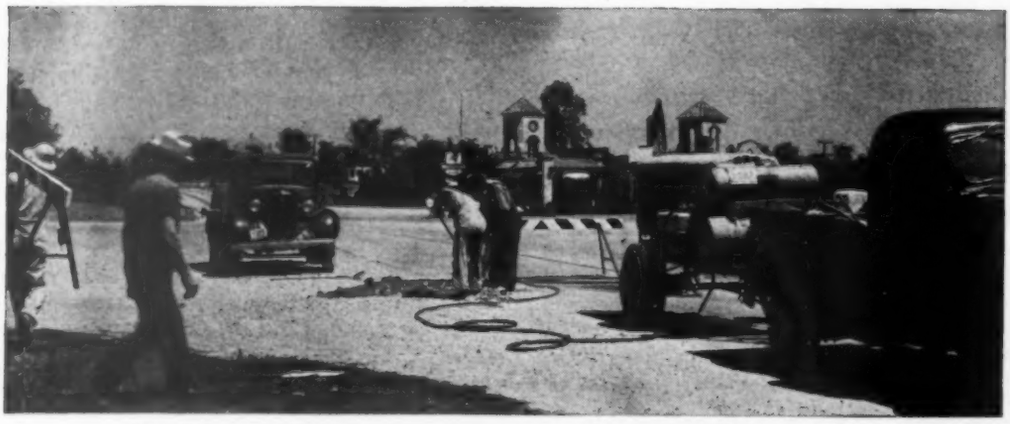
Manufacturers of

DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Trademark Reg. U. S. Pat. Off.

A cut like this
—high on the sides and low in the middle—held water and caused a condition like this:
If the cut were maintained like this—
low against the banks—crowned at the center—most of the water would have run off and the equipment could get back on the job sooner.

How to keep highways in condition for war traffic



Using pneumatic jackhammer to cut away a broken area before patching.

Keeping war traffic moving and maintaining highways in as good condition as possible, are major wartime responsibilities of highway authorities.

Although concrete pavements require minimum maintenance, neglect of simple operations may lead to expensive repairs or rebuilding later.

To meet present limitations of time, money, available equipment, labor and critical materials, a wartime maintenance and repair technique has been developed for concrete pavements.

This procedure covers sealing of joints and cracks, replacement of utility cuts, correcting settlement, and making other necessary repairs.

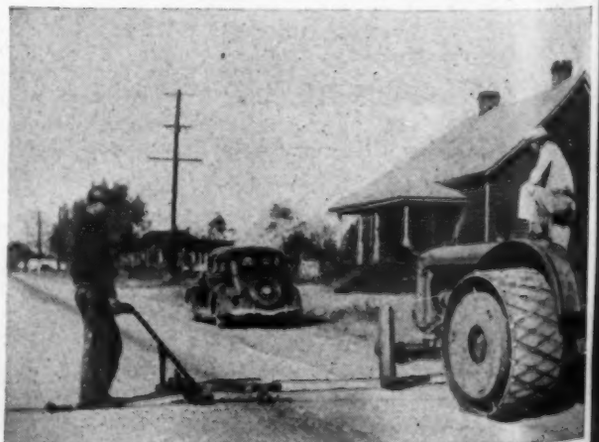
Extruded expansion joint filler being removed with shovel pulled by winch attached to truck engine.

Twenty-page information sheet (No. HB-17) was especially prepared to guide Army and Navy engineers in wartime maintenance of pavement facilities. This information sheet is also available to city, county and state officials concerned with maintenance problems. Mailed free in the United States and Canada.

PORTLAND CEMENT ASSOCIATION
Dept. A9-28, 33 W. Grand Ave., Chicago 10, Illinois

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

Buy More War Bonds



Winch on tractor pulls special "plow" used to remove old sealing material.

. . . and it's worth keeping!

THE leading tractor manufacturers have invested millions of dollars perfecting and refining their machines to give you, among other advantages, engineered balance for maximum performance.

Buckeye Cable Controlled Tractor Equipment is correctly designed to maintain that balance when installed on your tractors.

Buckeye builds a dozer and power control unit for every standard make and model of tractor, each designed specially for the tractor with which it is to be used.

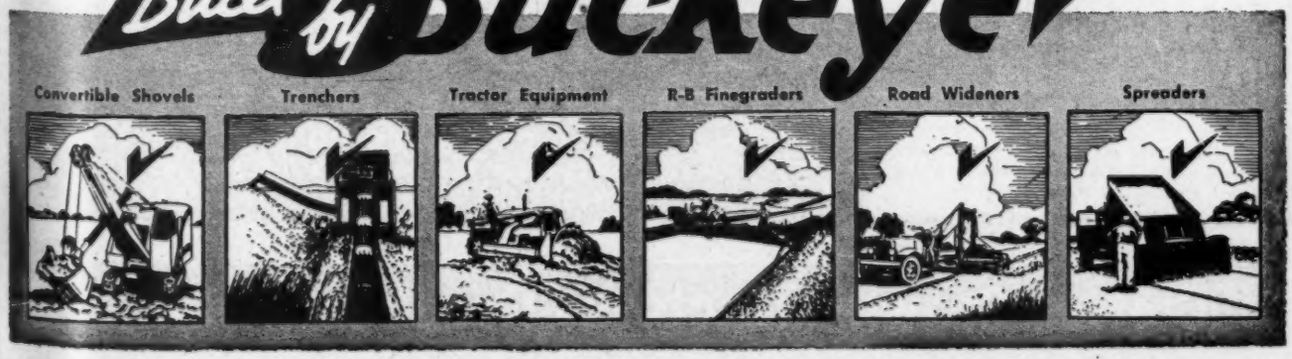
In the future when you consider dozer equipment, *remember Buckeye for balance.*

Remember BUCKEYE for BALANCE!

BUCKEYE TRACTION DITCHER CO.
Findlay • Ohio

Built by Buckeye

Check ad page 6



HOW TO ORDER *Repair Parts* FOR CRAWLER TRACTORS

• WPB order L-53-b controls the distribution of repair parts for track-laying tractors. According to this order if a part is critical, the prescribed certification, date of your order, and use classification govern deliveries. Preference ratings do not affect shipments or shipping date.

IF YOU ORDER PARTS BY MAIL

You must sign a certification in substantially the following form:

PURSUANT to the terms of Limitation Order L-53-b of the War Production Board the undersigned certifies to the seller and to the War Production Board that the following statements are correct:

(I).....

Make and model of track-laying tractor(s) for which repair parts are sought. (II).....

Factory serial number(s).

(III).....

Owner of track-laying tractor(s).

(IV).....

Type of work being performed by track-laying tractor(s) described above (describe the job specifically, i. e., mining, logging, agriculture).

(V).....

Contract number of war agency or P-19 or P-55 serial number and rating, if any.

(VI) The purchaser hereby certifies that he has registered all construction equipment owned by him pursuant to the terms of Limitation Order L-196, unless exempt from the requirements of such order.

(VII) The purchaser hereby certifies that the repair parts listed on the purchase order to which this certificate pertains are the minimum quantity of repair parts immediately necessary to put such track-laying tractor(s) in serviceable condition, and are not for stock.

(VIII) The purchaser hereby certifies that he does not have like parts on hand or on order to repair the above-described track-laying tractor(s).

.....

Date Name of purchaser

Address of purchaser.....

Get this form from your authorized Cletrac dealer or type and sign on the order which you mail him.

IF YOU ORDER PARTS BY TELEGRAM

WHEN parts are ordered by wire, the purchaser must include in the telegram: all information specified in items (I), (II), (III), (IV) and (V) of the written certification used for mail order, and the statement, "Certified under L-53-b." The tractor owner or an official duly authorized to make the certification must sign the wire. The statement, "Certified under L-53-b", shall constitute a certification to the seller and to the War Production Board of the correctness of all information included in the telegram and shall constitute a certification of all facts specified in items (VI), (VII), and (VIII) of the written certificate used for mail orders.

In such case, a copy of the outgoing telegram must be retained by the person placing the order and such copy must be signed by the owner or the authorized official of the company ordering the parts.

IF YOU ORDER PARTS BY PHONE

IN the case of a purchase order placed by telephone, the purchaser must state to the dealer at the time of placing the order, the substance of the written certification used for mail orders; and the person making the statement must be an official duly authorized to make the certification. He must furnish to the dealer, within 15 days after placing the purchase order, written confirmation of the order, bearing a written certification substantially in the form used for mail orders. In case of failure to receive written certification within the 15-day period, the dealer can not accept any other order from or deliver any additional repair parts to the purchaser until the written certification is furnished.

A Phone Order Must Be Confirmed With Written Certification

• The Cleveland Tractor Co. is operating day and night manufacturing and shipping more repair parts than ever before. We shall continue to exert every effort to meet present day abnormal demands.

There is a Cletrac dealer near you who will be glad to furnish you forms covering the above certifications and who will assist you in every way in keeping your Cletracs in continuous every day service during this war period.

Order All Repair Parts From Your Cletrac Dealer

THE CLEVELAND TRACTOR CO.

CLEVELAND, OHIO

BUILDERS OF CRAWLER TRACTORS FOR INDUSTRY AND AGRICULTURE AND GENUINE CLETRAC REPAIR PARTS

Cletrac Crawler Tractors • Gasoline or Diesel

ROADS AND STREETS

September, 1943, Vol. 86, No. 9

700 ACRES OF PAVEMENT

Design and construction features of huge western air base, graded in winter and paved in a whirlwind of desert dust. J. A. Terteling, contractor.

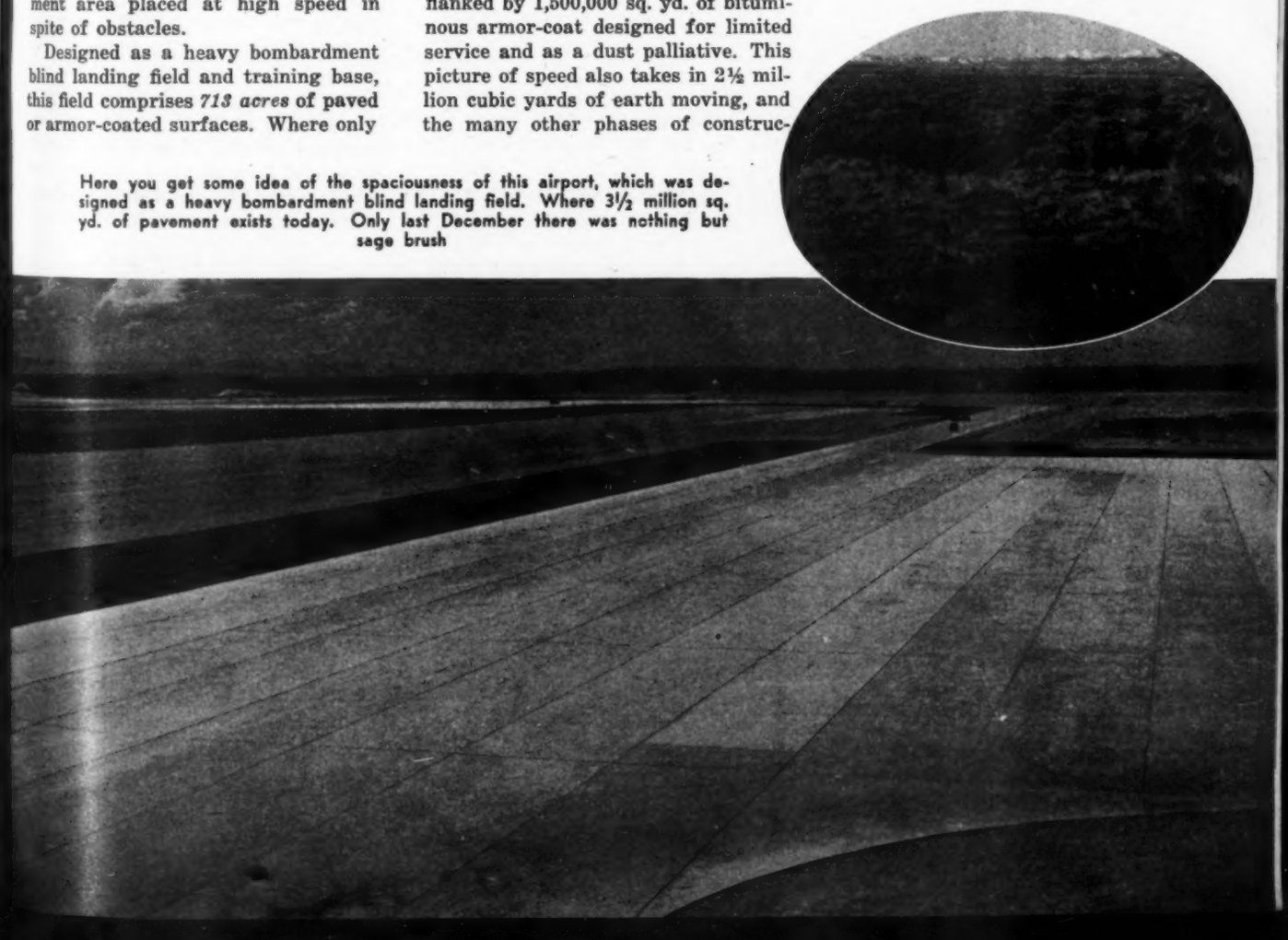
By HAROLD J. McKEEVER
Associate Editor, Roads and Streets

GRADING for runway sub-base throughout a bleak mountain-country winter, aided by anti-freeze brine in the compaction sprinklers, is one of the innovations on a desert air base just completed in the Northwest intermountain region. The project is notable for the large pavement area placed at high speed in spite of obstacles.

Designed as a heavy bombardment blind landing field and training base, this field comprises *713 acres* of paved or armor-coated surfaces. Where only sage brush and coyote holes existed last December, today and since early summer in fact planes have been landing on a system comprising 1,200,000 sq. yd. of asphaltic concrete runways and taxiways and 777,000 sq. yd. of portland cement concrete aprons, taxiways, turn-arounds and intersections, flanked by 1,500,000 sq. yd. of bituminous armor-coat designed for limited service and as a dust palliative. This picture of speed also takes in 2½ million cubic yards of earth moving, and the many other phases of construction of a modern air training base complete with a not-so-small city of hangars, shops, barracks and utilities.

Speed Wasn't Easy

Winter frost wasn't the only obstacle that had to be whipped. Originally scheduled for completion in the "im-



Here you get some idea of the spaciousness of this airport, which was designed as a heavy bombardment blind landing field. Where 3½ million sq. yd. of pavement exists today. Only last December there was nothing but sage brush

Subgrade anti-freeze! Over 6,300 tons of crude salt, in solutions ranging from 6 to 23 per cent, was applied on the subgrade to permit compacting during freezing weather

possible" time of four months, the job was retarded by labor and parts shortages and by one of the worst dust conditions ever encountered on an American airport job.

The speed that the contractor was able to maintain at times however can be pictured by the fact that at various periods—often simultaneously—he delivered a daily peak of 25,000 cu. yd. of excavation and compaction, 12,000 cu. yd. of subgrade ballast (17-mi. haul), 6,000 cu. yd. of leveling material, 2,500 cu. yd. of portland cement concrete pavement, and 3,000 tons of hot-mix runway topping. Over 4,000 workers and 700 pieces of equipment were flung at the task, which was pushed 24 hours a day at a pressure seldom if ever equalled in the experience of the U. S. Engineer and contractor personnel, which incidentally included a lot of case-hardened veterans.

The site was chosen with good flying weather, lack of obstacles and strategic location in mind, rather than ease of construction, although a flat area requiring relatively light grading was utilized. Good materials were located within rail spur-line haul.

Two-Mile Black-Top Runways

All paved surfaces were designed for 60,000-lb. maximum wheel load. There are three runways. The runway cross-section consists of a rolled subsoil; 13 in. of pit-run gravel (minus 3 in.), placed, sprinkled and rolled in 6 and 7-in. lifts; a 2-in. leveling course of one-inch-minus material; and a 2½-in. asphaltic concrete mat, primed with MC-2 and sealed and covered with RC-3 and stone screenings.

Asphaltic construction was also used for 12½-ft. shoulders along 75-ft. concrete taxiways, while concrete "blocks" in the black runways at taxiway junctions were given an asphaltic cover for color uniformity.

Concrete Has Sand Base

Concrete surfaces include a main apron 600 x 4,000 ft., a second apron 600 x 1,000 ft., runway ends, taxiways and intersections. Concrete is of 12-8-12-in. cross-section, thickened to 12 in. in a width of 12½ ft. on either side of filled expansion joints spaced 100 ft. or every fourth construction lane. Joints between lanes are keyed, and longitudinal dummy joints are provided at lane centers by means of ¼ x 4-in. premoulded strips.

Transverse expansion joints are spaced 120 ft.; construction joints, 15 ft. Dowels at transverse expansion joints are the only steel in the slab.

Specifications called for 7 inches of ballast or base of well-graded material, which permitted the use of a fine pit-run sand located adjacent to the area. This sand was given maximum compaction by saturating after placement. Special bearing tests, described elsewhere in this article, showed this material to have a load capacity in place superior to that of the average leveling course material.

Not All Material Excellent

An excellent local quartz-granite concrete sand met grading specifications without screening. A good decomposed granite diorite and porphry, naturally non-plastic and having a high cementing value, was available for the 650,000 cu. yd. of runway ballast. But from there on the material picture wasn't so good. The chief trouble lay with the coarse aggregate material, which was a soft and not-too-sound granite whose lack of strength necessitated a 6 to 6½ bag mix to get the 4,500-lb. design strength (cement-mortar strength exceeded aggregate strength).

Surface Drainage a Problem

Paradoxically, considering that the annual rainfall here is only 8 inches, surface run-off had to be treated as a major problem, because of the large impervious area involved and the possibility of occasional heavy flash rains. Aprons were flanked with shallow gutters having a 4-in. dip in 10 ft. of width. Runways were given 0.5 per cent transverse slope and a profile grade of 0.35 per cent minimum.

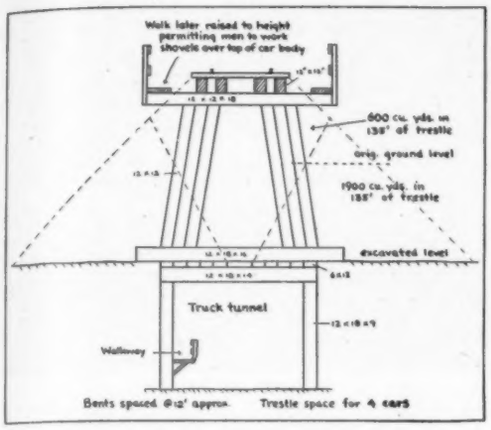
Storm water from paved areas collects in 40 field inlets, which lead via 41,600 lin. ft. of 12 to 60-in. concrete pipe to two unlined outfall trenches.

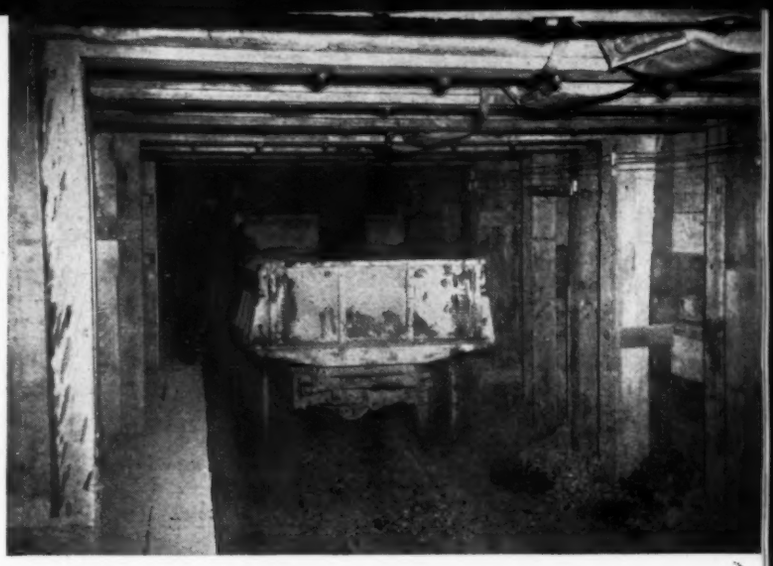
While only one rock outcropping interfered with grading, lava rock lay above the drainage line and ditching for pipe called for extensive rock excavation, varying from a few inches to several feet. Blasting and air hammers loosened for the draglines, while motor graders backfilled.

The Earth Moving Job

Again because of the large area, the seemingly "nearly flat" site necessitated 2,500,000 cu. yd. of grading.

The unloading trap handled 650,000 cu. yds. of ballast material


Walk later raised to height permitting men to work shovels over top of car body
600 cu. yds. in 138' of trestle
Orig. ground level
1900 cu. yds. in 185' of trestle
excavated level
Truck tunnel
Walkway
Bents spaced @12' approx.
Trestle space for 4 cars



A feature of the project was this ballast truck-loading tunnel, which is straddled by a dumping trestle about one hundred feet long. Trucks were filled in fifteen seconds, often aided by a bulldozer working "upstairs" between the bents when the pile ran low.

Cut and fill depths ran usually to a foot or two, with 5 to 6 ft. maximum. About 25,000 cu. yd. of rock was blasted and loaded with shovels.

The big earth moving task was handled by a fleet of thirty heavy-duty units including 8 tractor-scrapers up to 25-yd., 10 wheel-type scrapers up to 10 yd., 6 sheepsfoot units, and push tractors, bulldozers and graders. The soil here is a silty volcanic ash which quite often was hard and compact before disturbing, but without stability when loosened. The result of this combination was soft, dusty going on top, with tough cutting down at the blades. Especially since much lime-impregnated hardpan was encountered, double-header pushers were used to the limit.

Specifications called for 9 in. of compaction in cuts, and rolling in 6-in. lifts, with 95 per cent compaction under all runways and graded areas. Grading could seldom be organized to highest efficiency, due to the fact that earth moving began in advance of complete final designs and specifications.

600 Tons of Crude Salt

Feature of the grading was the use of a brine solution to prevent crusting by frost and permit compaction in below-freezing weather. Beginning in December more than a million cubic yards of soil, spread during the winter for sub-base leveling, was kept rollable by brine-impregnating to depths varying from a light sprinkle to 4 or 5 inches, depending on air temperature. A 23 per cent solution was used in coldest weather (down to —10° F.). Weaker solutions down to 6 per cent were used in milder weather.

Solution was made up in 1,000-gal. batches by pre-heating water, dumping in crude salt up to 1,850 lb., and agitating for about ten minutes.

It was a novel sight to see sprinkler trucks scurrying along in a cloud of steam.

"Dustier 'n the Devil"

It wasn't long after this job got under way before dust, whipped up by a constant stiff wind, began to be a terrific problem. Not only did mineral dust get into gears and crankcases and necessitate a record volume of field shop work, but dust prevention became a matter of concern in the operation of the completed field. It is reported as a true incident that two inspectors, who knew the field well, were lost for an hour one early evening on the swing shift, while trying to work back to the field office during a dust storm.

Dust prevention was a factor in the decision to let a second contract after work was under way, for about 1,500,000 sq. yd. of bituminous armor-coat "occasional use" areas along the 250-ft. shoulders of main runways and elsewhere. In addition, two inches of pit-run was thrown down on a considerable area, and still another contract was placed for discing three tons of straw per acre to a depth of four inches into 300 acres of the powdery soil. The effect of this measure was to create an artificial stubble field which would hold soil in place until a cover crop and grass could develop.

Armor-coating consisted of grade compaction, placement of 3 in. of pit-run rolled gravel, a light application of MC-2 and ¼-½-in. chips, followed by 200-300 penetration oil and an RC-3 seal, then "quarter-minus" chips and another rolling. This surface has a load capacity superior to that of many a highway pavement.

Ballast Hauled 17 Miles

The entire construction operation was planned around one of the controlling features of the job, which was the necessity of delivering nearly a million cubic yards of gravel, all the asphalt and much other material from a material pit and the main railroad line 17 miles away. This pit was the result, incidentally, of a long painstaking search late last fall for local aggregates, which at first looked mighty scarce. At one time the plan was to utilize volcanic cinders from a nearby butte, and a pit of excellent gravel near the surface and near the main rail line, was discovered only after plans and specifications were ready for letting. A dragline sounded this pit extensively before it was finally selected.

For volume delivery at low unit cost, a railroad line was the obvious answer. And built she was, from old 60 and 70-lb. salvage rail and other not-so-good available equipment, complete with cattle fences and crossing guards. The first intention was to handle all delivery over this line, and the 8 locomotives and 200 forty-ton dump cars did haul a peak of 16,000 cu. yd. (435 car-loads) in a single day. They averaged two-thirds of this, weeks on end.

But due to the speed of the job and frequent breakdowns of the old equipment, over 200 trucks had to be added to keep the field operations supplied. Many of the truck drivers were women, who stuck at the wheel twelve hours a day along with the men. Here was a typical wartime picture. While a "cat and dog" collection of rented trucks ranging from light dumps to 14-yd. floundered over a hastily improvised truck road, the rail dispatcher tore his hair as obsolete cars piled up at derails.

More than one time they simply built a "shoo-fly" around wrecks. There wasn't time to clear them.

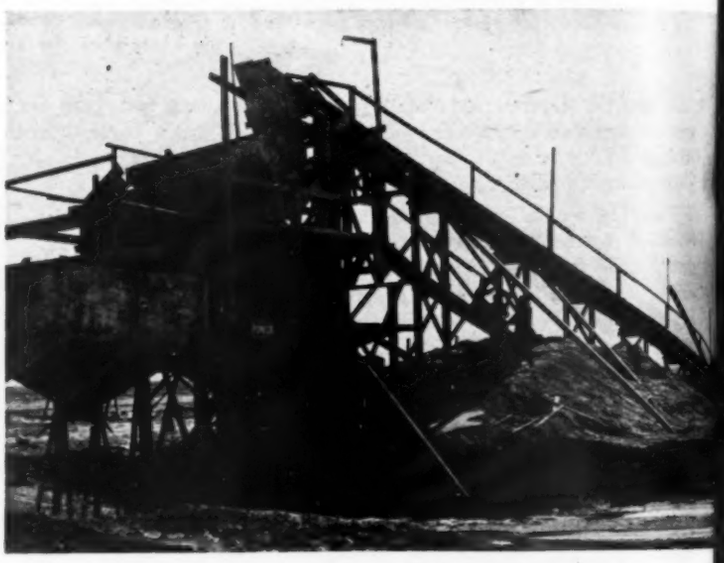
(*Continued on page* 46)

Despite the arid climate, drainage lines had to be provided for heavy occasional rains. About 41,600 ft. of pipe (12 to 60 in.) led to two large open outfall ditches

Rock drilling figured heavily here. Hardpan or lava usually was encountered near the ditch bottom

Graders did a little of everything on this project. After backfilling drain trenches they helped spread nearly a million cubic yards of ballast and other materials

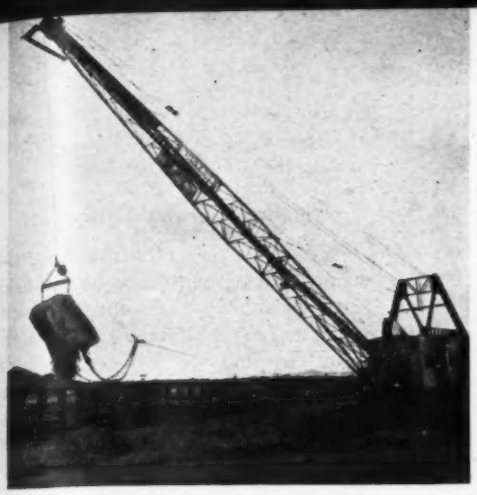
* * *



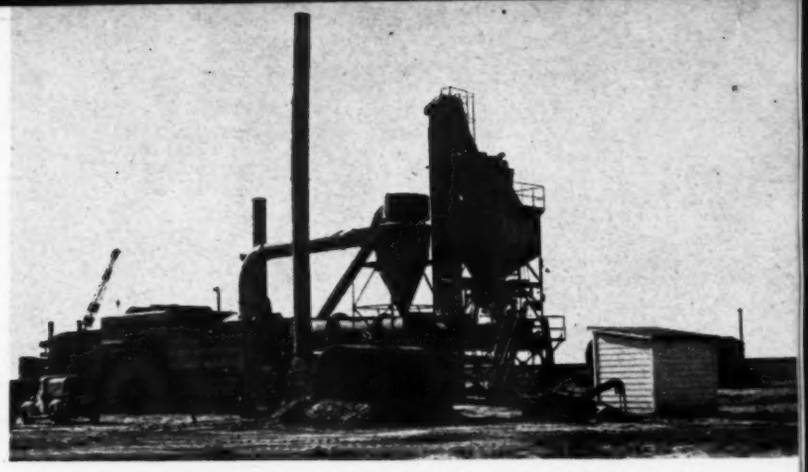
Aggregate plant for the black-top mix. One-in.-minus material was separated and recombined to control gradation.

Thirteen inches of ballast was spread under all runway areas before putting down the leveling course. Compaction was controlled through frequent density tests ↓

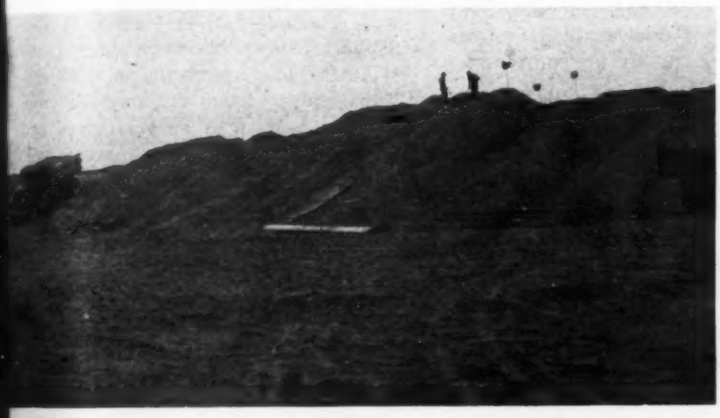
At the ballast pit were two screening plants and three crushers with 5,000 tons daily capacity. One plant by-passed screened-out fines around the jaw crusher →



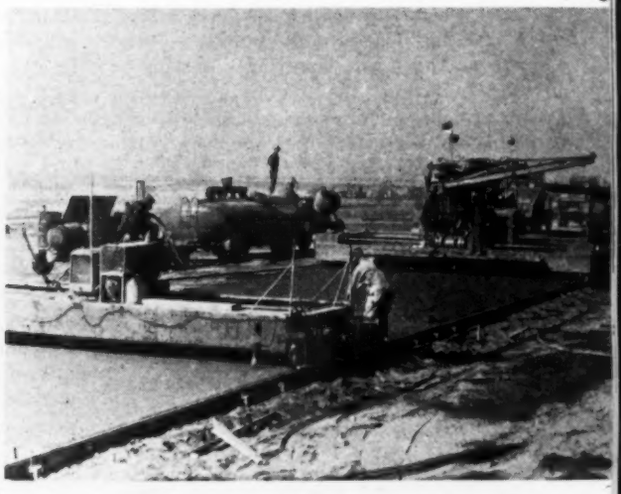
Loading ballast, the biggest tonnage item on the job. The pit grew to several acres in area as the job progressed, necessitating frequent shifting of rim loading track and equipment



Hot mix—149,000 tons of it—came from two 100-ton plants, with a third plant as stand-by. Elsewhere in this article note accuracy of grading control obtained in the mix



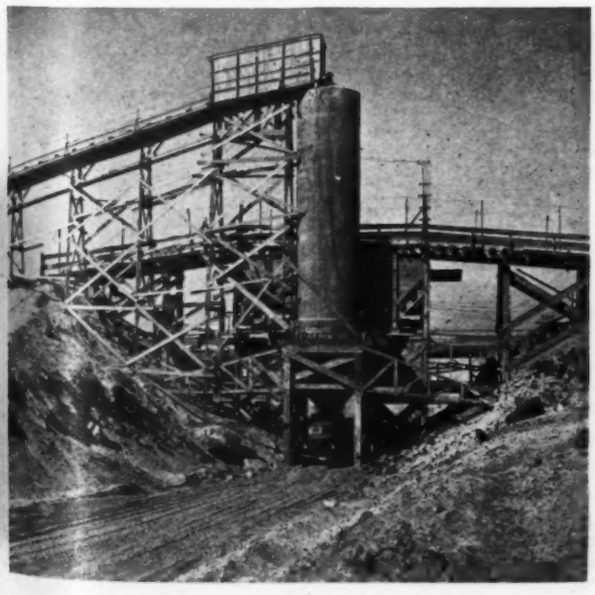
Where 200,000 tons of crushed aggregate was stockpiled in late winter. Up to 16,000 cu. yds. a day was hauled to the job when the season "got rolling"



777,000 sq. yd. of concrete in aprons, taxiways and other areas was included in the job

* * *

Modern cement silo. Cement cars were unloaded with tractors equipped with rear vertical lift fresnos, one pushing toward the door and one pulling cement out of the car



Parking apron under construction. The main apron shown is 600 x 4,000 ft. A second apron is 600 x 1,000 ft.

Paving one of the main runways—asphaltic concrete mat on 15 inches of processed material

At the pit, draglines on both sides of the hole loaded cars spotted on the rim or the track bisecting the working. During the winter, dragline stockpiled over 200,000 cu. yd. of crushed material in readiness for spring paving.

Maintaining the long dusty truck road, which was subsequently built into a modern access highway, was another tough problem. The contractor kept sprinklers going incessantly, and a tractor-scraper unit helped the graders keep down ruts and corrugations. In spite of every effort to nurse trucks along, forty of them were down for repairs at one time.

The pit was served by two screening plants and three crushers with 5,000 tons daily capacity.

Delivery at the Field

The rail line entered one corner of the triangular runway and field area, and looped around as diagrammed in accompanying sketch. A short spur independent of the loop was used to spot cars of priming material. The long siding in the loop was for the hot-mix material. Ballast—the big tonnage stuff—was dumped into a trestle pit at the far side of the loop, near geographical center of job.

Cement was spotted on a separate siding which served the batching plant and cement silo. Thus the main line was kept cleared at nearly all times for the big ballast job.

Ballast was dumped at an unloading trestle built over a truck loading tunnel—a slick layout which the contractor had used on other jobs. In the floor of the pit (tunnel ceiling) was a continuous hopper slot, with hopper openings abut 8 ft. apart, from which a four-ton truck could be loaded in fifteen seconds. When material was low, a bulldozer worked in between the bents. Bents were spaced to make room for this machine. Over 650,000 cu. yd. was handled by this trestle at remarkably low unit cost.

Cement Cars Unloaded with Tractors

Cement was delivered in box cars, and a small crawler tractor, equipped with a rear-end hydraulically operated fresno, pushed cement near the door. There, a small rubber tired tractor, with a similar fresno equipment, pulled cement out the car door and onto a floor, which in turn fed an endless belt leading to the silo.

Two of these car-unloading set-ups were in use, each capable of emptying a car of cement in about 40 minutes. (Very tough on equipment, however.)

Tractor grousers were fitted with wood blocks to keep them from chewing up the wooden car floors.

Wholesale Paving Operations

Five production units processed the various paving materials at the field. These included a 2,000 cu. yd. screening plant; a plant for bituminous aggregate, which was produced as 1-in.-minus pit-run, separated and re-combined to control gradation; another for leveling course material and chip stuff. Separate plants for concrete sand and coarse aggregate.

Over 149,000 tons of hot mix were served up from two modern asphalt plants of 100 tons each, working 10 to 12 hours daily (most paving was done in one long shift although other work ran 24 hours). A third stand-by unit was erected for emergency. Two asphalt pavers placed topping in 10 to 12-ft. lanes, operating in work sections up to 2,000 ft. long (cooling limit). Rollers of several types and sizes were used. Chips were tailgated, in the absence of sufficient spreader equipment. Loose chips remaining after rolling were worked to the surface edges with power brooms and spilled on the field.

Concrete totaling 174,000 cu. yd. was placed with three 34-E dual drum pavers, working teamed up or singly. The sand cushion was placed dry just ahead of the paver, being spread by a special bull-dozer blade fitted with

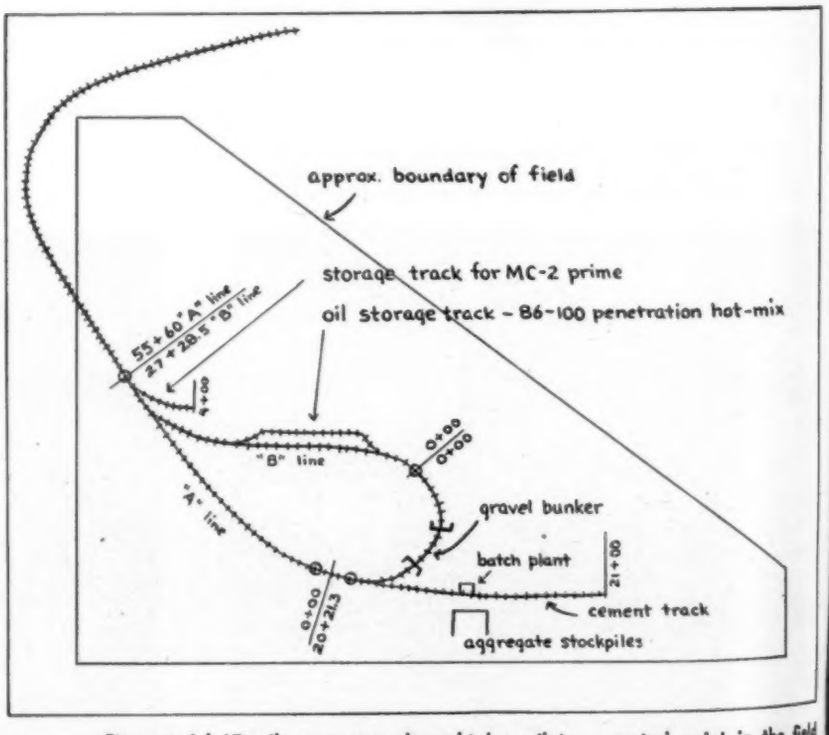


Fig. 2 Pit material 17 miles away was brought by rail to a central point in the field via a carefully designed loop line. Note that the main line of the loop is designed to be kept clear for handling large-tonnage ballast for runways

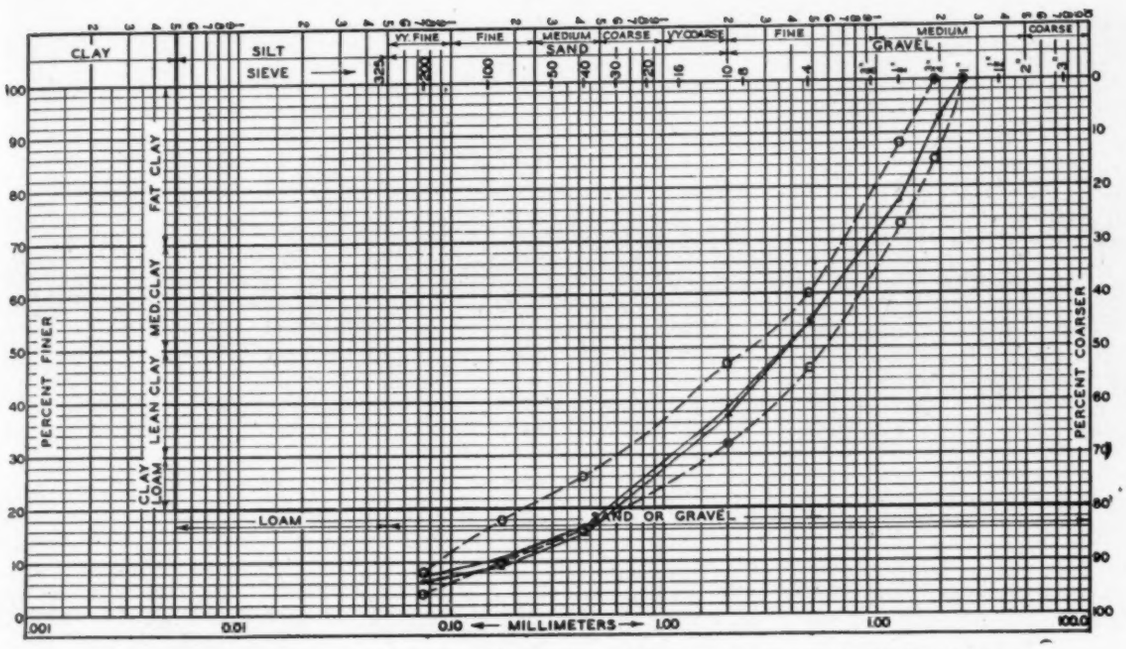


Fig. 3 Two solid lines show how accurately the two asphalt plants came within specified limits on gradation of aggregates. The effect of passage through the hot-mix plants was to blow out slight quantities of the fines. Gradation checks were averaged daily and reported to the area engineer every week, by a chief inspector of long experience on asphalt paving design and construction

routers at either end to screed for the concrete edge-thickening, and designed to ride the forms and lift and lower with the bull-dozer attachment. Sand was saturated for compaction before placing concrete.

Concrete was spaded but not vibrated along the forms, belted, and given a membrane curing cover. The only difficulty was in belting. The soft rock, rich mix and excess of minus-40 aggregate material resulted in a "doughy" mix which tended to tear and pull under the belt until the finishers got the hang.

Surveying Took 60 Men

Use of more than 100,000 grade stakes again underscores the immensity of this project. Runway and building lines were located by coordinates from a single base point. Fifty to sixty survey men, including many with little experience, were employed for a time, mainly organized in six-man parties with transit and level or two levels. Some of the most experienced parties were kept on control work.

Soil Testing Methods

Control tests were run on all grading, complete compaction tests being made over each completed area before acceptance. One and sometimes two soils men were "kept running" long hours, working from a portable skid-mounted field laboratory, outfitted with Proctor equipment and for running modified AASHO tests for acceptance.

Of special interest is a series of experimental tests run on the sand leveling under the main concrete apron. The purpose was to determine whether the actual bearing value of the sand in place deviated from values computed in advance by routine methods.

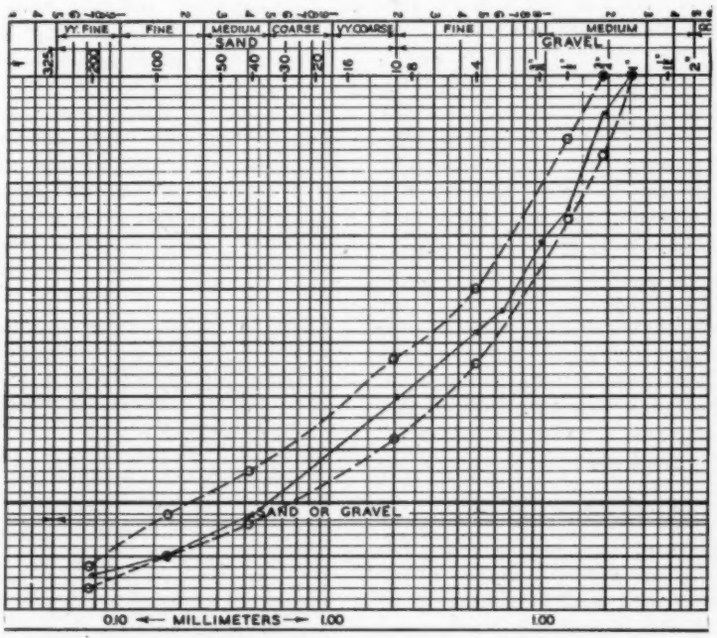


Fig. 4 The middle line here is the master curve of mineral gradation at the stockpile

Nine test holes were employed. The procedure was as follows:

1. A 3x3 ft. beveled block was cast in the middle of a joint panel while placing apron concrete, using a wood form as a separator. The slab was equipped with counter-sunk steel tie-downs, or plane anchors, for use as lifting stirrups. Block was lifted out at the time of the test.

2. A steel cylinder, 2′ 6½″ in diam., was set down in the square and rested carefully on the sand so as not to disturb it. Tar paper was placed around the outside of the cylinder to facilitate removal, and the 3x3 ft. area outside the cylinder filled with concrete. Tar paper was also placed over the exposed sand to protect it.

Compaction tests were part of elaborate measures to insure the safety and adequacy of this port

Conducting a plate bearing test on one of the runways

3. The first test, a bearing plate test on the sand, was then made after removing the paper covering and the steel cylinder. Pressures up to 50 lb. per sq. in. were applied via a platform on which was run the front wheels of two 12-yd. scrapers loaded to capacity with sand.

4. The load was removed, the circular concrete collar originally cast outside the cylinder broken away, pressure again applied, and sand samples taken from the outside corners of the 3x3 ft. area for a density test.

5. The sand was then removed and a density test sample taken for the underlying soil, and the square hole filled permanently with concrete.

Preliminary results of this experiment, which involved unit pressures and deflections far in excess of those caused by the maximum expected wheel load concentration, verify the high indicated bearing value of this subgrade, which was assumed at 20 lb. for slab design.

Miscellaneous Details

Clearing of sage was a pesky job here. After trying out a ripper rigged up with a blade, the crew fell back on the time-tried method of using heavy motor graders.

An important adjunct to the project is a 15-mile 20-ft. black-top access highway now connecting the field with the nearest town, main highway and rail line. This was built by the airport contractor with federal funds, under PRA supervision and state highway contract.

Water supply came from 500-ft. wells, drilled to serve the base. The runway contracts included 42,000,000 gals. of water for sprinkling, concreting and other purposes.

Equipment upkeep here is a whole story itself, to be highlighted in a subsequent issue of ROADS & STREETS. The seven hundred machines on the job needed more mechanical attention than twice that number in normally heavy service, due to the dust and the necessity of rebuilding or manufacturing scarce parts.

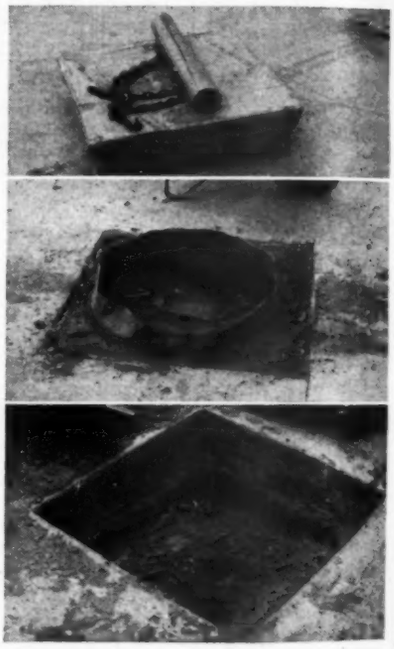
Organization and Management

This project suffered along with others in the general shortage of men. Three-shift operations at times were reduced to one or two for this reason. A shortage of experienced inspectors was a handicap. The lack was the more acute because of the pell-mell speed, which always necessitates more careful inspection.

The project was carried out under the Pacific Division (Portland District) of the U. S. Engineers, whose personnel along with the contractor's included some of the best qualified engineers and construction men from surrounding states. Several state highway departments were well represented.

The project was under the immediate supervision of an area engineer, and of assistant area engineer with offices at the field. The entire air base job was divided into three parts, the buildings and utilities and the runways coming under two officers, and the engineering and utilities, or "paper work," for both phases assigned a third officer next in command under the assistant area engineer. This setup proved highly successful in its purpose, which was to relieve construction personnel to use their full time and energies in the field. Airport construction was supervised through key men in charge respectively of materials, asphalt paving, concrete paving, testing, equipment, etc. Men in the field were instructed to settle their arguments and differences with minimum attention from the area engineer's office.

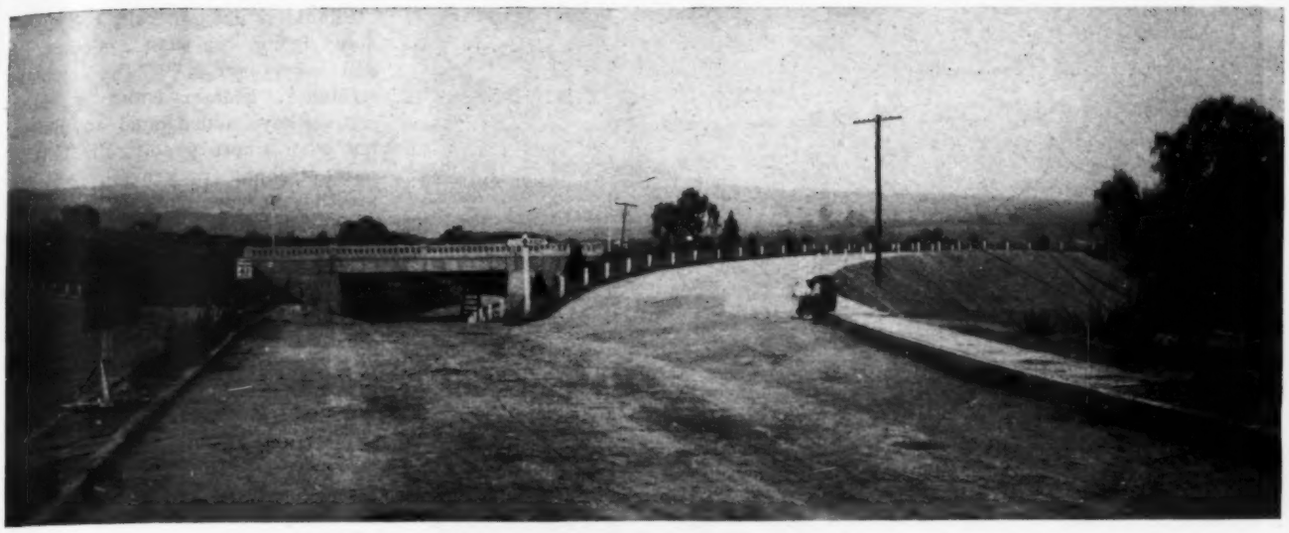
The contractor was J. A. Terteling & Sons, a large operator from Boise, Ida., and well known in the Pacific Northwest as a grading man. He handled practically all the grading and paving job except the asphaltic concrete, which was sub-contracted to Birch & Son. William (Bill) Foss was project manager. A general superintendent handled each of the main functions—gravel pit, concrete, etc.—each super having three shift foremen and as high as ten to fourteen sub-foremen.



Top: Showing 3' x 3' concrete block removed preparatory to sampling apron subgrade and leveling sand for special experimental compaction test

Middle: Circular metal plate and paper in place, and concrete collar poured. Note paper over sand to protect it until sampled

Bottom: Hole after concrete collar had been broken away and all base and sub-base samples taken. Hole is then permanently backfilled, tamped and concreted



Extension of the Insurgentes Road to the intersection of Cuernavaca Highway, near Mexico City

Mexico's Roads as Seen by an American Engineer

By JOHN C. BLACK
Field Editor
ROADS AND STREETS

In order that this article may appear in the current issue of ROADS & STREETS, I am obliged to write it before covering the last stretches of my journey through Mexico. I am now at Ixtepec on the Isthmus of Tehuantepec. Tomorrow I go by bus to the city of Tehuantepec, then by train to Arriaga (for there is no practical highway service at this season) and by bus to Tuxtla Gutiérrez, from where I shall fly to Tapachula on the Guatemalan border.

Obviously one does not traverse all the highways of a great country in the course of a six weeks' visit, nor study all the details. But having covered, in company with engineers of México's Dirección Nacional de Caminos, some 3500 kilometers (2200 miles) of the main national highways (Caminos Federales), plus 1000 kilometers of road built and maintained jointly by the Federal Government and various states under the system of Juntas Locales de Caminos, plus also numerous sections of local roads maintained variously by the Federal Government, the States, private companies, and farmers (including the atrocious 17 mi. to the Volcano Paricutín), I have been able to form a pretty clear idea of the Mexican system—its merits and its faults.

Maintenance

Of all that I observed, the excellent character of the maintenance on main highways impressed me most. Outside the cities, the surfaces of these roads are of asphalt—some of plant mix construction but the major part of penetration type. A continuous close patrol repairs ravellings and minor surface defects as soon as they appear, thus saving ultimate expense and keeping a safe and comfortable road at all times. The same patrol keeps shoulders clean—and in order—even to the extent of hand mowing and weeding.

The author and some Mexican engineers at Highway Headquarters at Monterrey. Left to right: Juan Manuel Talavera, contractor; Eng. J. Francisco Rodriguez Cabo, Asst. Chief, Maintenance Dept., Mexico National Highways; Eng. Miguel Diaz Morlet, Division Chief, Rio Sabinas to Laredo; Eng. Pablo Dominguez, representative of the Secretary of Communications at Highway Headquarters of New Laredo; Eng. John C. Black

Extensive resurfacing is in progress at many points, the necessity arising in some instances from uneven settlement of subgrade, but also in part from anticipated heavier traffic with the return of peace-time conditions. Minor alignment changes are being made where most needed. The engineers consider that by carrying out such operations while traffic is abnormally light, they will save ultimate road maintenance costs and much inconvenience and expense to traffic.

A major present difficulty in reconstruction operations lies in the equipment situation. Not only is new equipment almost unobtainable, but spare parts are equally scarce, and in spite of much skillful improvisation many machines are out of service for lack of them. Tires present a similar, and perhaps more serious problem, for while Mexico is producing enough passenger car and bus tires to meet its current needs, it does not make the large sizes for heavy construction equipment; and for the time being at least, cannot get them from the United States. Some thought is being given to possible substitutes for rubber, but so far as I have learned, no actual experiments have been made in this field.

It is true, of course, that the rela-

Los Cantiles near Km. 281, on Route 4, from Mexico, D.F., to Guadalajara. Photo by courtesy of Eng. Lara

tively low cost of labor places Mexico in a better position than the United States as respects maintenance, but it is not true that the supply of labor is inexhaustible. In fact, at the present time, a definite shortage prevails in comparison with pre-war conditions. Furthermore, modern roads require machines—graders, rollers, distributors and others—for proper maintenance, even with plenty of labor available.

Design and Character of Pavement

In choosing their types of pavement, the Mexican engineers have done well, having provided surfaces adequate for immediately prospective traffic needs but without the extravagance of excessive refinement or durability. On the major federal and state cooperative roads, the base consists of from 20 to 25 cm. (8 to 10 in.) of gravel or crushed rock, and the surface of about 2½ cm. (1 in.) of asphaltic carpet, made generally in three penetration applications on successive layers of coarse sand or screenings. The riding quality of most of these surfaces is excellent. Under bad subgrade conditions, a "cushion course" of some 20 cm. of well rolled rock or gravel is sometimes used below the regular base course.

The standard surface width of 6 meters (19.7 ft.) also was well chosen for adequacy without extravagance. In the vicinity of Mexico City there are considerable stretches which should be widened, but on the majority of the roads 6 meters suffices for the present. Some of the secondary road surfaces are only 5 meters wide—an admittedly narrow pavement by modern standards, but on those 5-meter roads which I have seen the traffic was exceedingly light.

Shoulders are generally too narrow, many being less than 2 meters wide and few over. On the mountain stretches, greater width would, of course, have added much to the cost, but even where grading is light the narrow shoulders prevail. Not only are they narrow, but the "fantasmas" (white painted stones or concrete guard posts used extensively on curves and high fills) encroach upon them in many instances. Thus there is not room to park with all wheels off the pavement, or to pass comfortably when three cars come opposite one another. The widening of shoulders is one of the first steps México will need to take as traffic increases.

Bridges and Culverts

Bridges on México's main highways are of varied types and good appearance. Steel structures are well cared for and should last until outgrown. Abutments, piers, retaining walls and culverts are generally of stone masonry, that type of construction being cheaper than concrete, and much better looking. For openings of less than 2 meters, pipe culverts are used extensively. Prior to the war, considerable amounts of corrugated steel were imported from the United States for this purpose, but at present concrete is used of necessity.

The old colonial bridges of artistic merit and sentimental value have been saved where possible, sometimes at considerable expense in the alteration of approaches.

Location Problems

Anyone who has made location surveys in mountainous, or even in rolling country, knows how difficult it is to judge the quality of a location without studying the survey data. The reconnaissance engineer covers countless kilometers which the user

(*Continued on page* 57)

Left: Typical double arch masonry culvert on Camino Chino-Gral Teran (Federal Aid Road) near Monterrey. (Photo by courtesy of Direccion Nacional de Caminos de Mexico.) Right: One of Toluca's well paved streets

Asphalt Paving Job Successfully Completed in Midwinter

By GEORGE C. STANLEY
City Engineer and Street Superintendent
Burlington, Vermont

WHAT is believed to be the first and possibly the only asphalt paving job to be constructed in Vermont in mid-winter is that of Hayward Street, Burlington, Vermont. Completed during January, 1942, and still showing no ill-effects from winter placement, this pavement consists of a 6-in. sand cushion on a heavy clay sub-base, 8-in. telford stone base, and a 2-in. layer of stone binder course (1½-in. max. stone into which was applied a hot asphalt emulsion), and a 2-in. wearing surface of stone-filled sheet asphalt.

Because of the low temperatures for several days preceding the penetration of the binder course, (zero to 10° below) boiling water was applied to the crushed stone from an asphalt pressure distributor to remove the frost, and the asphalt emulsion (Amer. Bitumuls' H.R.M.) heated by live steam to a temperature of approximately 200° F. was applied immediately at the rate of 1½ gal. per sq. yd.

The hot-mix wearing surface was manufactured at the municipal asphalt plant and placed immediately, while the binder course was still warm, thus—assuring a perfect bond between the two courses. The asphalt used for the hot-mix was a 61-70 pen. asphalt cement mixed with about 30% of 85-100 pen. asphalt binder material to facilitate ease in placing by hand and to lower the min. temperature required. The atmospheric temperature on the days on construction were; Min. 0° F., Max. 35° F.

In reconstructing the street the old curbs and gutters were broken up as telford material. A line of 6-in. drain tile was installed one foot back of the newly constructed curb on either side of the street. Tile trenches were backfilled with crushed stone to within one foot of the ground surface, then tar paper was spread over the stone before completing the back-fill to prevent infiltration of topsoil.

The telford base was thoroughly rolled with a 15-ton roller, and the binder course and wearing surface with a 10-ton tandem roller. The spreading of the hot-mix wearing surface was done with hand rakes.

Penetration asphalt being applied on January 24, in below-freezing weather. One of the first, if not the only asphalt job of this type of construction in mid-winter in New England.

Hayward Street job, Burlington, Vt., showing placement of telford base

Washington Plans to Rebuild War-Torn Roads

Washington highways, too, are taking a beating under the increased volume and weight of wartime traffic and many must be rebuilt according to State highway director Burwell Bantz. The 1943 program consists of resurfacing projects totaling $4,000,000, in addition to $3,000,000 carry-over work on access roads.

As an example of the increase in trucking on certain routes, one section of state highway that formerly carried few trucks will move an estimated 11,600 log loads of 72,000 lb. each this year. This haulage is requiring the reconstruction of 28 miles at a cost of $400,000. Twenty-six lesser projects of a similar character are contemplated.

This year's work also includes strengthening eight major bridges which are required to carry heavier loads, and bituminous treatment of 380 miles of roads as a "preventive" measure.

In spite of a shortage in engineering personnel, plans will be completed by the end of the year for about $15,000,000 in post-war road and bridge projects on the Washington state highway system.

Stiffleg-Traveler Sets 78-Ton Girders

High lift and unusual girder-length add to difficulties erecting Arroyo Seco river bridge at Los Angeles

By PAUL R. WATSON
Resident Engineer
Calif. Div. of Highways, Los Angeles, Calif.

LIFTING of 60 to 78-ton girders into a high-level deck, using a combination stiff-leg and traveler which engaged an adjoining bridge span as a counter-weight, is a construction feature on Arroyo Seco Parkway bridge just being completed over the Los Angeles River.

This bridge is part of a 1.2-mile extension of Arroyo Seco Parkway as a freeway from San Fernando Road to Yale Street near downtown Los Angeles. The entire project, largely completed by the State Division of Highways with WPA labor in 1941 and 1942, involves a new high-level 4-lane concrete roadway, parallel to the existing 4-lane Figueroa Street. The new roadway is to be used for inbound traffic, converting Figueroa to the out-bound side of the freeway. It crosses the Los Angeles River valley over an 800-ft. viaduct comprising five concrete and three steel spans. Described here is the erection of the three steel spans, the part of the structure not included in WPA work before it folded up last winter.

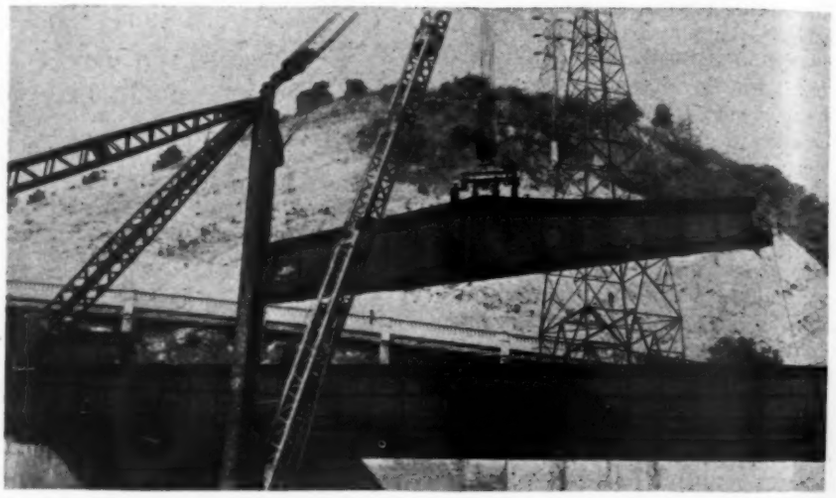
Three Spans Involve 86-ton Girder Sections

The steel portion of the bridge comprises three skewed deck-plate-girder spans, 186½ ft., 200 ft. and 100 ft. in length, resting on high concrete piers and an abutment approximately 100 ft. above the river floor. There are three lines of girders. The center-span girders cantilever to approximately the ⅓-point on the end spans, where they are joined to simply supported end spans by means of expansion cradles. The center girders were fabricated in two sections each approximately 145 ft. long and weighing up to 78 tons.

The three girders for the south end were varying lengths, due to the different skew of the abutment, the longest piece of steel being 146 ft. long and weighing 82 tons.

"Stiffleg-traveler"

Steel for the center and north spans was lifted into place by means of a special rig resting on the flat concrete-paved river floor. As shown in photos, this outfit comprised a large stiff-leg of 85-ton capacity. One corner (the long leg) was anchored under a steel column extending up to the bottom girder flange of Figueroa Street bridge which parallels the new structure. The maximum upward thrust of the column during full hoist load was calculated at 25 tons, well within safe limits. This anchored corner acted as a pivot, around which the derrick corner and the other counter-weighted corner of the stiff-leg turned on a curved mono-rail track.

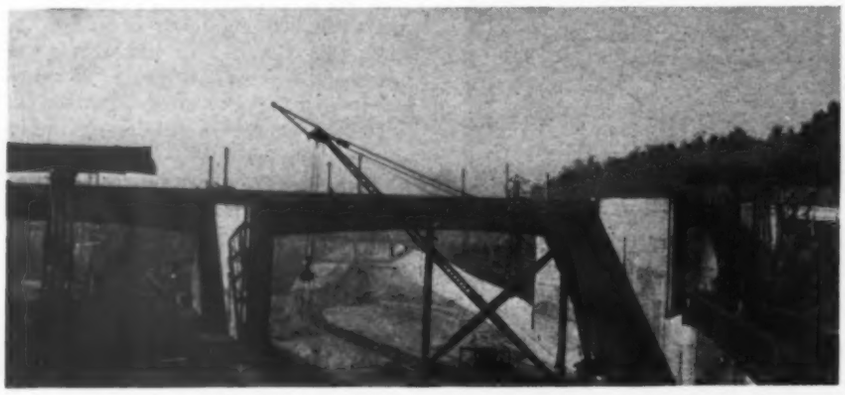


Seventy tons coming up! A 12-part load line had to lift girders 100 ft. on the Arroyo Seco Los Angeles River bridge

The stiff-leg's travel arc was laid out to permit the setting of all steel for the two spans from one anchored pivot position. The crane was moved to the desired position by means of breast lines anchored to the sides of adjoining concrete piers, power being furnished by a 30-h.p. steam donkey engine.

When in position for lifting, the derrick corner was supported on blocks resting on the concrete river floor, thus taking weight off the mono-rail.

A 175-h.p. gasoline engine furnished power for a 3-drum hoist. Steel for handling by this unit was delivered by flat car along a rail line which passed in a convenient diagonal path immediately adjacent to the job, as shown in photo. Girder sections were first lowered to the ground, to clear



General view of the crane. Note how fixed corner is anchored down by steel column up-thrusting against girder of existing bridge which paralleled the job. Girders over tracks at left and over river set by this 125-ft. boom. Girders for south span at right were set by cranes from parallel roadway

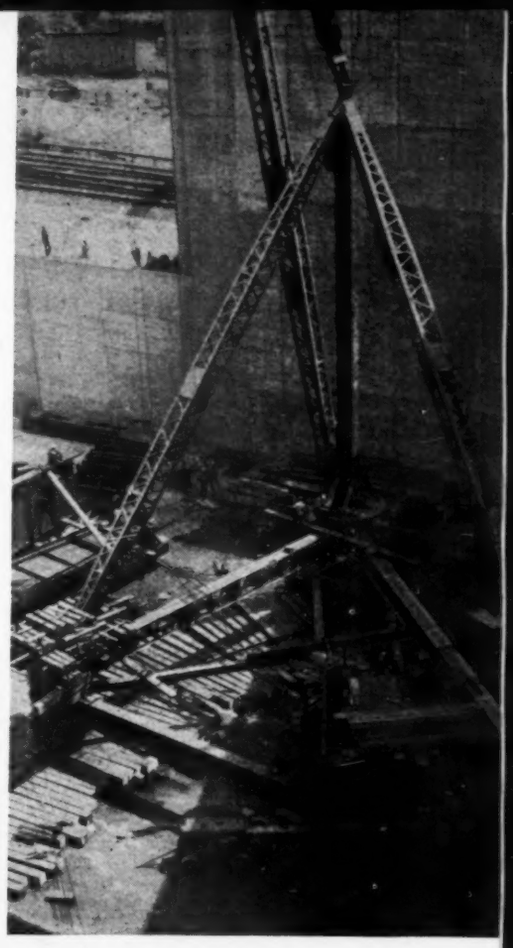
the rail line quickly. Then came the big lift, which was a ticklish job due to the combination of unusual lifting height and heavy load. The 125-ft. boom was equipped with a 12-part load line and 22-part topping lift (⅞-in. preformed rope), the topping lift alone requiring over 3,000 linear feet of rope.

End Girders Also a Setting Problem

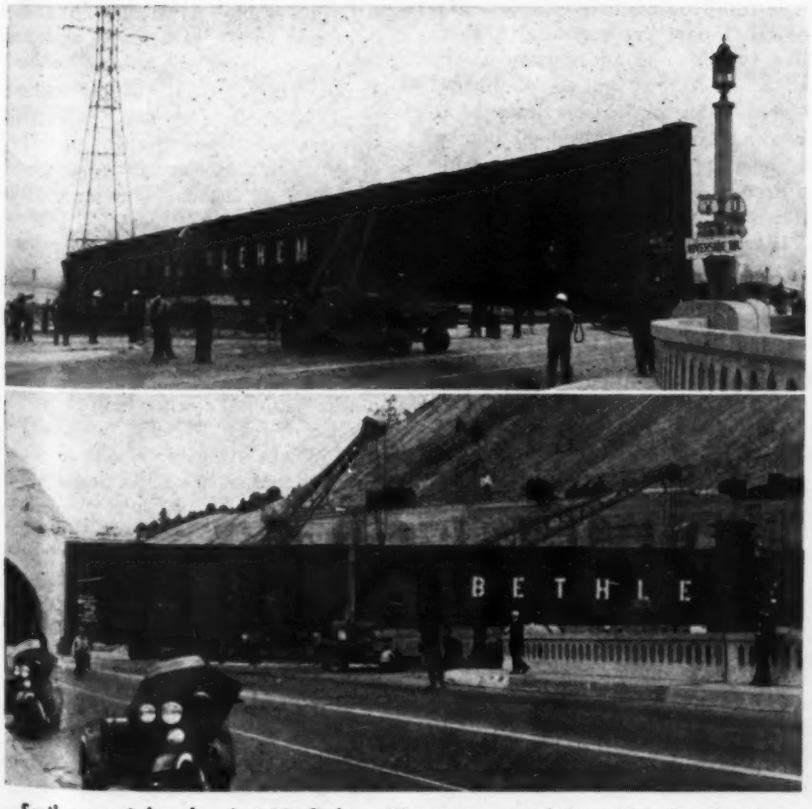
The south end girders were delivered and set by an entirely different procedure. These three girders (longest 82 tons, 142 ft.), were brought to the job by a trucking company, using a wrecker house mover rig. Figueroa Street, which is one of America's busiest thoroughfares, had to be closed for only three hours. Girders were lifted and set by a 60-ton and 40-ton crawler crane, one machine holding its end steady while the other inched around until its end of a girder was in position.

Bethlehem Steel Company had steel fabrication and erection at a contract price of $268,000. The job involved 1,000 tons of structural steel and 23½ tons of shoe castings. Of interest is the fact that the stiffleg-traveler was one of four used in the construction of the George Washington Bridge in New York several years ago. It more recently served on a job at Pocatello, Idaho, then was brought on west to Kaiser's new Fontana steel plant near Los Angeles.

A. S. Vinnell Co. and Engineers, Ltd., of Alhambra, Calif., were awarded a $120,000 contract for sandblasting and painting the steel, building the concrete deck and grading and paving the approach. H. Carpenter was superintendent for Bethlehem; Paul R. Watson was resident engineer for the California Div. of Highways; John Green, senior bridge engineer; S. V. Cortelyou, district engineer; and F. W. Panhorst, state bridge engineer.



A feature of the job was this combination stiffleg traveler which pivoted on a monorail (around fixed corner at lower right)



South span girders, heaviest 146 ft. long, 82 tons, were each brought to Los Angeles on three flat cars (above), hauled by street to the job by a heavy house moving outfit (below, left), and set by two crawler cranes (lower left corner)

New Jersey Highway Commissioner in Europe

Spencer Miller, Jr., state highway commissioner of New Jersey, is in Great Britain conferring on post war construction at the request of the British government.

County Engineer C. F. Griggs Commissioned

C. F. Griggs, county engineer of Spokane County, Washington, has been granted a leave of absence to accept a captaincy in the Corps of Engineers. Prior to seven years with this county, he was a construction engineer for the Diamond Match Co. for 10 years.

Linseed Oil Treatment Against Scaling

Ohio plans extensive treatment of newer concrete roads following successful experimentation

By H. D. METCALF
Chief Engineer, Bureau of Maintenance, Ohio Department of Highways

The Ohio State Department of Highways has treated about 15 miles of its newer concrete pavements experimentally with linseed oil emulsion in the past two years. All pavements treated were in their second year except one, which was newer.

As a result of encouraging success with this means of protection against chemical scaling, an additional 150 miles of such treatment has been planned. While it is possible that linseed oil for this work will not be made available this year, it will be helpful to review our experience to date.

While the department makes extensive use of chemicals in winter, in the past it has avoided use of chemicals on concrete pavement less than 4 years old, available data indicating that nearly new concrete is the more vulnerable to chemical action. Chemicals have been extremely helpful in controlling ice elsewhere, one practice being to spread 300 to 400 lb. of coarse crystal rock salt (CC salt) per mile of 2-lane road, spreading down the centerline as soon as an inch of snow has fallen. When alert maintenance men have spread salt promptly over a light snow mulch, then additional covering can be bladed away down to this inch, and the salt will continue to be effective underneath in the meantime.

At the same time that emulsion was applied, accelerated tests were performed in the state testing laboratory which indicated definite benefits.

The various test sections have now passed through one or two winters of chemical application and without exception have shown an almost complete elimination of scaling, or a marked reduction compared with scaling of adjacent untreated sections of pavement built at the same time. A 1-mile tested section on State Route 23, north of Columbus, for example, was found on careful inspection after two winters to have only one small, thin scaled area in the distance, while some 15 to 30 small scaled areas per mile had developed elsewhere. This is a 2-year-old dual highway, the treated mile involving one roadway only. Traffic in either direction averages 2,500 to 3,000 vehicles daily including many heavy trucks.

Details of Treatment

The emulsion consists of 1 part linseed oil, 1 part kerosene and 8 parts water to which is added soap at the rate of ¼-lb. per gallon of linseed oil used. The mixture is designed to provide 1/100 gal. linseed oil per sq. yd., about 1/10 gal. of emulsion being required.

The emulsion was first applied back in 1941 with an ordinary orchard spray. On windy days there was a large loss of sprayed material. Later, better results were obtained with a bituminous pressure distributor using the linseed oil emulsion. No special equipment is involved. The mixture is emulsified right in the distributor. Treatment is done in warm, dry weather. The pavement remains slightly slippery for two or three hours, then dries and all visible effects of treatment disappear within a few weeks. The cost is about 2 to 2½ cents per sq. yd.

The practice has been to apply one traffic lane at a time. Occasional scale near the centerline indicates that the spray has skipped an occasional narrow center strip, and future practice will be to overlap about 3 inches. Greater care also will be taken to see that no dirt remains along the pavement edges at the time of application. A second application is contemplated for some sections.

While results have been definite enough to justify enlarging the mileage treated, the use of linseed oil emulsion is still classed as experimental, and all sections will be watched carefully. In view of the low cost, even a small retardation in scaling will make the treatment profitable.

About 1/10th gal. of linseed oil emulsion per sq. yd. is applied with a bituminous distributor

Capt. N. A. Bosley Now Executive Officer

Capt. Noble A. Bosley has been advanced to the position of executive officer, Seattle engineering district, U. S. Army. Capt. Bosley assumes the position held by Col. H. J. Wild, who reaches the retirement age. Previously Capt. Bosley served as assistant chief of the construction division of the Seattle district.

Lt. Commander T. J. Fowler Now Overseas

Lieutenant Commander Thomas J. Fowler of St. Paul, formerly associate regional engineer of the War Public Works Division of the Federal Works Agency, has been placed in command of the 82nd Seabees Battalion which is now somewhere overseas. He was previously construction engineer for the Public Works Administration and prior to that was connected with Duluth and St. Paul contracting firms.

LeRoy D. Snyder Heads Iowa State Alumni

LeRoy D. Snyder, Humboldt, Iowa, bridge contractor, was recently elected president of the Iowa State College Alumni Association.

Development of the Buffalo Waterfront as a Post-War Planning Project

By CHAS. R. WATERS
Dist. Eng., N. Y. Dept. of Public Works
Buffalo, N. Y.

FOR many years the people of the Niagara Frontier in Western New York have looked forward to the day when the waterfront area along Niagara River would be developed into a beauty spot commensurate with its natural possibilities.

Their hopes are now in the process of being fulfilled as, with Legislative approval, plans are being prepared for a through highway in this area from Buffalo to Niagara Falls. It will be known as the "Niagara Thruway", and is one of the important "Post-War" projects of the area.

Twenty-nine miles in length, it will extend from a point on the proposed Erie Thruway (principal east-west Thruway across the State) in the town of Hamburg to and through the city of Lackawanna; thence through the city of Buffalo along the shores of Lake Erie and the Niagara River; thence across Grand Island with two crossings of the East Branch of Niagara River; thence through the city of Niagara Falls to connect with the new Rainbow Bridge across the Niagara River to Canada.

The importance of the project grows as one considers the local territory that will be served in addition to the large number of tourists who annually visit Niagara Falls and the vicinity. The Niagara Frontier with its population of approximately one million, is the second largest metropolitan area of New York State. The city of Buffalo is one of the largest railroad centers in the country and, in addition, is one of the principal ports on the Great Lakes as well as being the western terminal of the State Barge Canal.

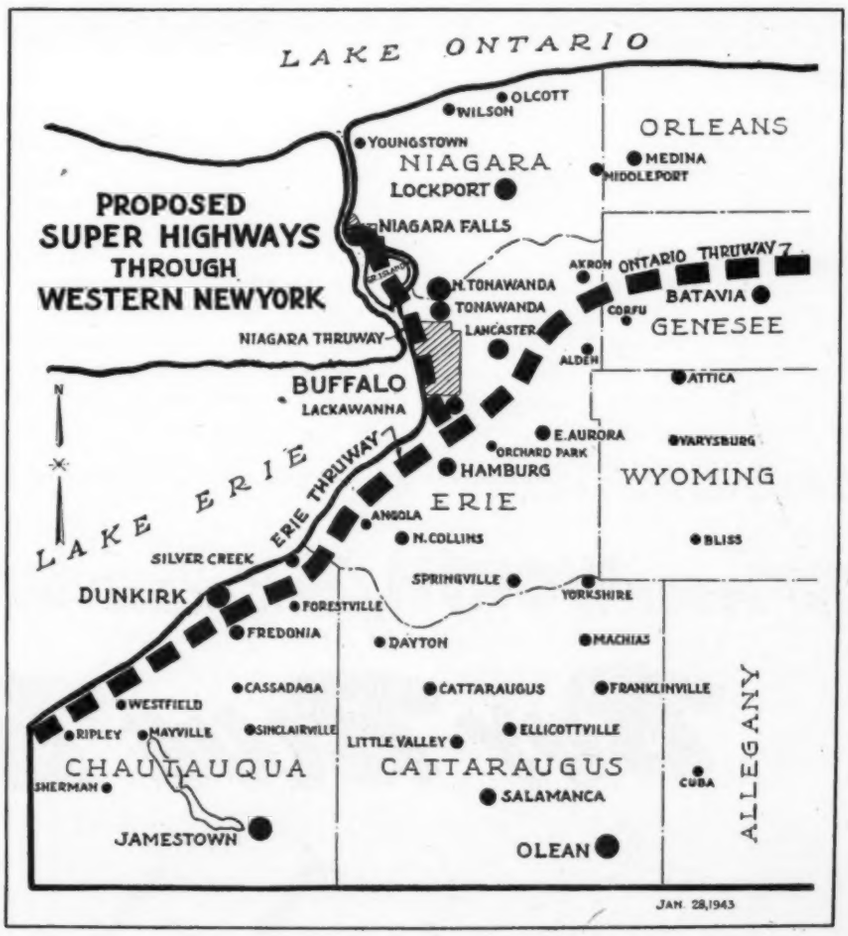
Due to a steady growth in industry over a long period of years, the Niagara Frontier has become one of the largest industrial centers in the country. However, during this period of industrial growth, long-range planning for adequate highways through the congested areas of the locality lagged behind and as a result the existing streets and highways are closely confined by waterways, bridges, steel mills, grain elevators, railroads, etc. Consequently, numerous problems confront the designers of the Niagara Thruway.

One of the problems of major importance is a crossing of the Buffalo River, which is approximately six hundred feet wide at the point of crossing. It is proposed to cross this stream either by a tunnel or a high level bridge. Either method will be expensive, as a number of industries will, of necessity, be abandoned or moved. A high level bridge would require long, expensive approaches due to the necessity for a vertical clearance of 125 feet.

Another problem of considerable magnitude is the heavy snows that frequently block sections of the eight miles of highway along the eastern end of Lake Erie. Prevailing winds are from the southwest directly off the lake, and during snow storms heavy drifts form along the shore.

Along the entire waterfront through the city of Buffalo the area is largely occupied by industries, railroads, and waterways. The general problem resolves itself into the design of a line and grade that will provide satisfactory highway conditions for traffic, both present and future, with the least amount of damage to waterfront industries and facilities.

This project is being progressed under the direction of Chas. H. Sells, State Superintendent of Public Works, with C. R. Waters, District Engineer in Western New York, in immediate charge of the planning work. Paul Schoellkopf is Chairman of the Niagara Frontier Authority.



Arthur A. Dobson Commissioned Lieutenant Colonel

Arthur A. Dobson, prominent highway contractor of Lincoln, Neb., has been commissioned a lieutenant colonel. Lieut. Colonel Dobson, a graduate of the University of Nebraska, is a member of the firm of Dobson & Robinson, highway contractors, and a national director of the American Road Builders' Association.

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*Reg. U. S. Pat. Off. ‡Blue Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy until Victory.

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Mexico's Roads as Seen by an American Engineer

(Continued from page 50)

of the finished road never sees, and the locator makes many a careful trial before finally fitting his line to the ground. Obviously, then, any comments of mine must be of a most general character and without dogmatism.

As I have seen these roads from a comfortable car, winding through the maze of mountains and valleys which forms so large a part of the Mexican terrain, my first impression is that the location of any practical route is an achievement. But this achievement rests not entirely with twentieth century engineers. Time and again I noted the old colonial highway traversing the same valleys and the same ridges as the road of today. The grades were steeper, the curves unstudied, the descents and ascents of canyons terrific, but the ancients had found the right general route.

Secondly the modern locations are a source of proper pride to the men who made them. Obviously they cannot be perfect, and as I passed I saw occasionally a feature which I thought might be improved, but at the same time I felt a certain meanness in judging a great work in a passing moment. The fitting of these roads into narrow gorges and around sharp points, the judicious crossing from side to side of ridges, the selections between hillside and valley locations, all inspire admiration. In general the newer locations seem superior to the old, the best of all being, I should say, the 120 kilometers of construction now in progress on the Pan American Highway to the southeast of Oaxca, on which I spent a most pleasant and profitable two days as the guest of the resident engineers and contractors. In rugged character of topography, this section closely resembles the long stretch between Valles and Zimapan on Route 1, from Nuevo Laredo to México, D.F.—a road of scenic grandeur with few rivals.

Grades and Curvature

The Mexicans have rigidly limited their grades to 6%, but have been less conservative with regard to curvature. By common United States standards, many of the turns are terribly sharp; but when one considers that a thousand such cases call equally for longer radii, each at a heavy increase in construction cost, the flame of criticism sinks low.

On one point, however, the engineers seem definitely to have erred. They have used superelevations too steep for practical driving on these turns, and in the many instances of sharp reverse curves, or curves connected by short tangents, the warping of the surface has been terrific. Only a "stunt driver" can negotiate these places at the speeds for which they are designed, and several drivers with whom I have talked say that they regularly shift gears on reaching them. I anticipate some radical correction of these conditions in the coming years.

In Conclusion

This article has already become longer than was intended, and I must end it with no reference to second or third order roads, and without mention of many things of which I should like to speak—the keen appreciation of scenic values evidenced in the locations; the widenings of town and city streets to accommodate main highways, and the bypassing of villages where that seemed the better course; the excellent "campamentos" of the maintenance department; the hard-working and efficient administrative organization in the city of México; and frankly uppermost in my own mind, the courtesy and consideration which I have received on every kilometer of road from Laredo to Ixtepec. I anticipated good things in Mexico and have found better.

▼

National Safety Congress to Meet Oct. 5-7

The National Safety Congress, in Chicago on October 5, 6, and 7, will mark one of the most important milestones in the entire history of the accident prevention movement.

Last year's Congress started the machinery of the nationwide drive to save manpower for warpower. With that campaign in high gear this year's program is devoted exclusively to accident problems which have a direct bearing on prosecution of the war and winning it.

The National Safety Congress, which is the annual convention of members of the Council and other safety leaders in the military, agricultural, industrial and civilian life of the country, actually is 26 conventions within a convention, and annually draws 10,000 safety leaders from all over the country. The 5,700 corporate and other members of the Council are classified in 26 membership sections according to type of industrial enterprise represented by each member.

29-MILE STREAMLINED LOGGING ROAD

Big logs assaying up to 10,000 board-feet per load began using this road even before it was completed

How a heavy-duty truck road was built through the Sierra foothills to tap a new wartime lumber source; notes on $48,000,000 Western raw materials access road program of which this job is a part

THE new highway east into the mountains from Jackson, in Amador County, California, has more the appearance of a modern automobile road than a logging road. The fact is, it combines the elements of both. Its roadbed was built to carry heavy emergency loads. And its easy grades and curves—which after the war will find no complaint from vacationists speeding up this route to Lake Tahoe—were provided for an immediate utilitarian purpose: to help move huge tonnages of logs and lumber needed in the war effort.

Twenty-nine miles of road was built here, tapping timber that will yield 50,000,000 board-feet annually of vitally needed structural timber and long poles

Establishment of an economic ruling grade and minimum curve radius here was a nice study in transportation economics. Each reduction in grade meant a further saving in trucks, mechanical wear and tear, tires and drivers. Average loads are around 60,000 lbs., a single 16-ft. log sometimes weighing almost this much.

Scores of Timber Access Roads Needed

Before describing some of the features and methods of this job, it will be of interest to review the federal government's raw materials access road program as a whole. As of June, 1943, nearly 4,000 miles of roads in 470 projects were built, under construction or planned in the eleven Western States, Alaska and Hawaii. Lumber, recently so high on the criti-

Short circuit on America's busiest assembly line

A SHUDDERING JOLT, a careening lurch i
darkness, and a truck laden with vita
supplies crashes into the ditch . . .
Instantly, an important link
system—the nation's busiest
out like a blown fuse, all
break in the pav
trap. This mea

. . . and all because of road failure!

The Barrett advertisement above, clipped from The Saturday Evening Post, emphasizes the vital importance of maintenance and repair to keep America's war-time highway system in first-class fighting trim.

It points out that despite gasoline rationing, America's roads are actually wearing out faster today than in peacetime. Right now, with truck traffic up more than 40 per cent—with 4,500,000 trucks transporting raw materials and finished goods—this country's highways are doing extra duty day and night.

That is why road officials and engineers are making *maintenance* the keystone of their current programs. Worn roads can cut down production schedules, waste vital man-hours, menace national safety and cause costly damage to automobiles and tires.

Why not discuss your maintenance problems with the Tarvia field man? There's a right type of Tarvia for the repair and maintenance of almost every type of road.

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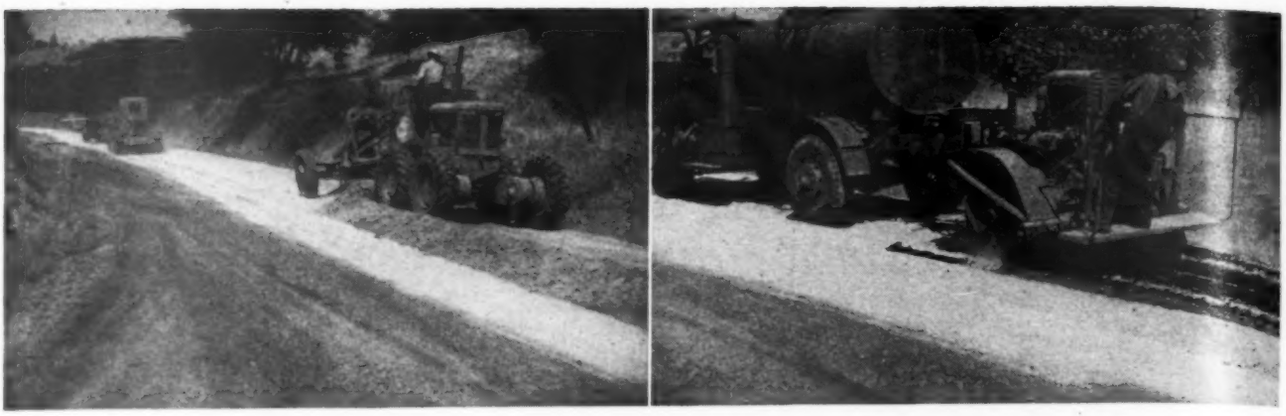


Material for bituminous road-mix leveling course was placed as quickly as possible to lay dust and speed lumber hauling

Harold J. McKeever, Associate Editor of Roads and Streets, with Superintendent C. E. Bovey inspecting a 26,000-lb. log, 3240 board-feet awaiting truck pick-up

cal list, is the reason for 38 of these projects. Strategic minerals including bauxite, copper, iron and manganese account for 199 projects, while 233 are not classified.

To June, this year, $48,700,000 of federal and other funds had been released, including the $10,000,000 set up under the Defense Highway Act of 1941 and recently increased to $26,500,000.

California is the scene of the largest number of these roads, since funds were not allocated between the states on any fixed basis but as determined by war need. To date more than $24,000,000 has been released for the timber and mine roads in California. Individual projects range in cost from $1,500 to $350,000. They also vary widely in degree and character of improvement, from projects of relatively high standard on the permanent road system, such as the Amador County job to be described, to temporary low-type bulldozer-graded trails back to minor mineral deposits or stockpiles.

Of necessity many involve new locations. Considerable expenditure has been required even where roads already exist, since existing roads were usually designed only for summertime recreational use by light vehicles. Logging 9, 10 or 12 months of the year, as it is being pushed during the war, would soon tear these roads to pieces.

Amador County Project Largest to Date

Largest of the California timber access road projects to date is the 29-mile job in historic Amador County, where gold was discovered in 1841 and where two of the world's deepest gold mines exist today.

The road begins at railhead at Martell, near Jackson, at elevation about 1500 ft. It ends at 5,000 ft. in the midst of one of the nation's finest remaining stands of stately ponderosa and sugar pine, white and red fir and cedar—trees which have already begun to yield 90-ft. piling, big dimension timbers and highgrade structural lumber to the tune of 50,000,000 bd. ft. annually.

The project consists of modernizing, strengthening and straightening 9 miles of county road and 20 miles of steep, winding, 16-ft. state highway. The county's portion was partly completed last year with county and lumber company funds.

The state contributed $40,000 which had originally been set up for opening up another part of this road farther back in the mountains. A $300,000 federal allotment plus about $13,000 donated by the logging companies brings the cost to $353,000, or about $12,000 per mile, which is considered a gratifying low cost for heavy-duty mountain road construction under present conditions.

The logging company's contribution includes a 37-ft. cut and a 20,000 cu.yd. fill, built this year on the state section with their own and rented equipment to help them get started. The work was started in the early part of the year. Later on a section was constructed by State forces, the expense of which was partially borne by the logging and lumber companies. This line and grade change was 1.1 miles in length and involved the handling of 40,000 cu. yd. of excavation. The right of way was donated by farmers and timber land owners.

Using the road today are the Winton Lumber Company, MacDonald Logging Co., and Barry Logging Co. McDonald Logging Co. began early

Decomposed granite for base and surfacing was loaded at pits along the job. Note trucks spotted back-to-back to speed loading, and 2,500-gal. storage tank to keep mixing machine going when oil trucks were delayed

in the season and by mid-summer their twelve diesel semi-trailers were making thirty 78-mile round trips daily down to the sawmill with 7,000 to 10,000 bd. ft. per load—nearly 2,000,000 lb. a day pay load. This Co. (McDonald) will deck 10,000,000 bd. ft. of logs at approximately 4,000 ft. elevation for all-winter hauling to the mill. Another firm is constructing a mill at the upper end to haul out finished lumber. Considering that many of the log loads gross 40 to 45 tons, this road is in for both an intensity and a volume of heavy loads that would put any highway roadbed to a severe test.

Modern 24-ft. Roadway

The new roadway consists of 12 in. of selected pit material placed 24 ft. wide on a 24-ft. roadbed and covered with a 3-in. bituminous road and plant mix surface 22-ft. in width and sealed. Several major line changes as well as numerous minor ones were necessary to eliminate grades as steep as 12%. One major change was required to eliminate an adverse grade which had proven to be a bottleneck to the loggers. One logger claimed this 12% grade had cost him $10,000 last year in repair costs. Some downhill grades still run as high as 8½ per cent, but 7 per cent is the maximum adverse for loaded trucks.

Numerous 50-ft.-radius turns were reconstructed to 300 ft. minimum radius, for the benefit of long pole loads and a general speed-up. Superelevation on sharp curves was reduced to provide for a safe speed of 30 miles per hour as a safety measure for high, slow-moving loads. A standard 2% crown has been provided on straight-aways.

Manpower Shortage Felt Here

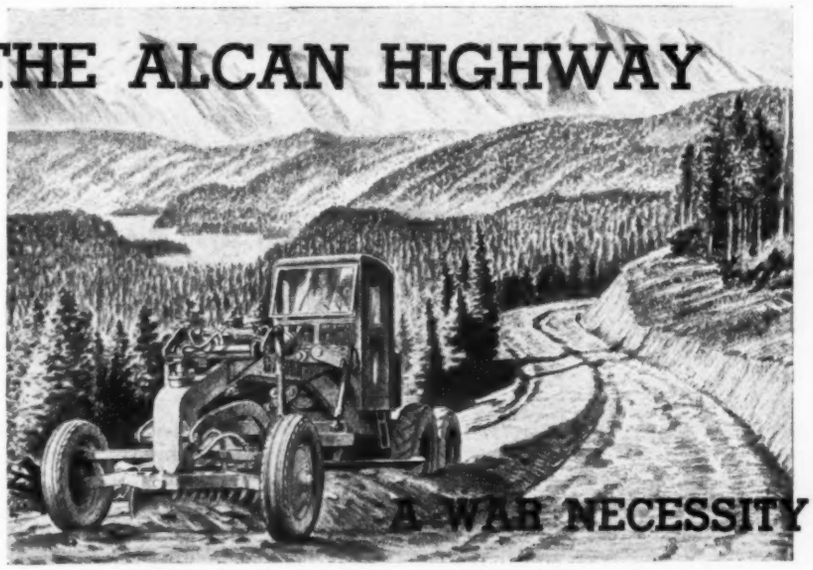
California's problem in connection with its access roads is primarily one of supervisory and engineering personnel. The state highway department has been called upon by the Public Roads Administration and local authorities to take over a large share of the jobs. Until recently it has been virtually impossible to attract contractors, due to the abundance of Government war projects.

Making a Speedy Start

To expedite the job in the absence of complete plans it was decided to build the Amador county road with state maintenance forces. Work began with the help of a "shot gun" estimate, the surveys and plans, as well as right of way acquisition, being completed as the job moved along. A speedometer distance survey and aneroid elevation readings were made along the existing road, as a rough basis for securing approval of funds. Material quantities were estimated "by eye," and corrected later.

The need for haste, lack of formal plans, necessity of making the best of available equipment, and the wide range of conditions involved, all combined to put a premium on initiative in the field. This need was further sharpened by the fact that the material estimate proved too low; every possible economy and ingenuity had to be exercised to get the job done without asking for more funds. For example, the base and surfacing material was estimated at $1.00 per cu. yd. in place, an extremely low figure—yet one which was somehow not exceeded.

Surveyors plunged through a blanket of snow last winter to get an early start, and equipment came along in February while snow still lay on the upper end. The first work on the county portion under this project was the reinforcing of the existing road bed with gravel. The reinforced road bed was thoroughly watered and compacted and then treated with liquid asphalt as a prime or tack coat for the surfacing. A road mix leveling course was then placed over the oil-treated reinforced base, both as a



Built in record time, the vital supply route to Alaska is a fitting memorial to those Canadians and Americans who planned and completed it. Both men and machines deserve the credit. Mountains, snow, freezing weather and construction difficulties required rugged and dependable equipment . . . the kind that Galion builds . . . for day and night service. Galion rollers and graders met the severe test with the U. S. Engineer Corps on this strategic job. They are also serving with the Air Force, Coast Guard, Marines, Navy and Seabees . . . helping to speed the final Victory.

The Galion Iron Works & Mfg. Co.

Main Office and Works: Galion, Ohio

GALION

Spreading oil over stock pile area adjacent to aggregate pit

leveling course and to protect the base until the final surfacing was laid.

About 120,000 cu. yd. of excavation and 160,000 cu. yd. of surface material placement were handled by several outfits assembled wartime fashion "from here and there." One rented outfit consisted of three tractor-scraper units of 28, 15 and 9-yd. capacity and heavy and medium bulldozers. A logging company helped with three heavy tractors, a 15-yd. scraper, two bulldozers and a motor grader. The state contributed a ½-yd. truck shovel, two compressors for lava rock work, power graders, rollers, tractors and dozers, tank and dump trucks and numerous miscellaneous equipment. A considerable amount of additional equipment was rented including two power shovels, several motor graders and a large fleet of trucks. About fifty trucks were kept busy, and more were always needed.

Power rollers were employed, and approximately 4,000 M. gal. of water was applied to aid base compaction under traffic. When the red clay at the lower end gave trouble in the early wet season, the excavation and grading equipment was moved into the lava and decomposed granite on the upper end.

Money Saved in Aggregate Production

Aggregates for base and surfacing came from laboratory tested pits of creek-run gravel, decomposed granite and lava, located in the general vicinity of the job but still requiring up to 10 miles of haul on mountain grades. Several pits were located in cut areas, to "kill two birds." One deep sidehill cut for the new grade was utilized as an excellent source of material. The main pits were located 2 to 3 miles from the highway.

The aggregates although showing exceptionally high stability (43 per cent, as measured by state stabilometer test, with .002 shrinkage) had a very fine sieve analysis, 25% passing 200, 40% passing 50, 75% passing 16, and over 90% passing ¼-in.

All the gravel, lava and decomposed granite used in the base and for all the surfacing which was road mixed, was loaded with power shovels from the various pits. The mixing plant was used as a central mixing plant. It was set up at the decomposed granite pit; the material was bull-dozed to the plant with the tractors and bull dozers. The bucket loader then picked up the material and fed the mixer. The mixed material was loaded directly from the mixer into the trucks with a belt conveyor attached to the mixing plant.

The actual cost of mixing the material, including the cost of feeding with the tractors and dozers, was approximately 30c per ton, or 36c per cubic yard. The cost of hauling from the plant to the road, of course, varied according to the length of the haul. The cost of the liquid asphalt in the mix was approximately $1.25 per ton of mix, or $1.50 per cubic yard. Therefore the total cost of the mix, including the liquid asphalt in the mix, f.o.b. the mixer, was approximately $1.90 per cu. yd.

When hauling trucks weren't on hand to load, the loader was kept going by one or two standby trucks which stockpiled near the pit. Ground areas for stockpiling were first oil-treated to help keep the material clean.

A trailer type distributor was used in applying liquid asphalt for road mix treatment. About 40,000 gal. per mile of MC-3 liquid asphalt is required in the bituminous surfacing.

Plant-mix topping was spread with a black-top paver and rolled with power rollers.

Oil was fed to the machine from tank trucks via a 2500-gal. storage tank, this storage unit serving while trucks were enroute.

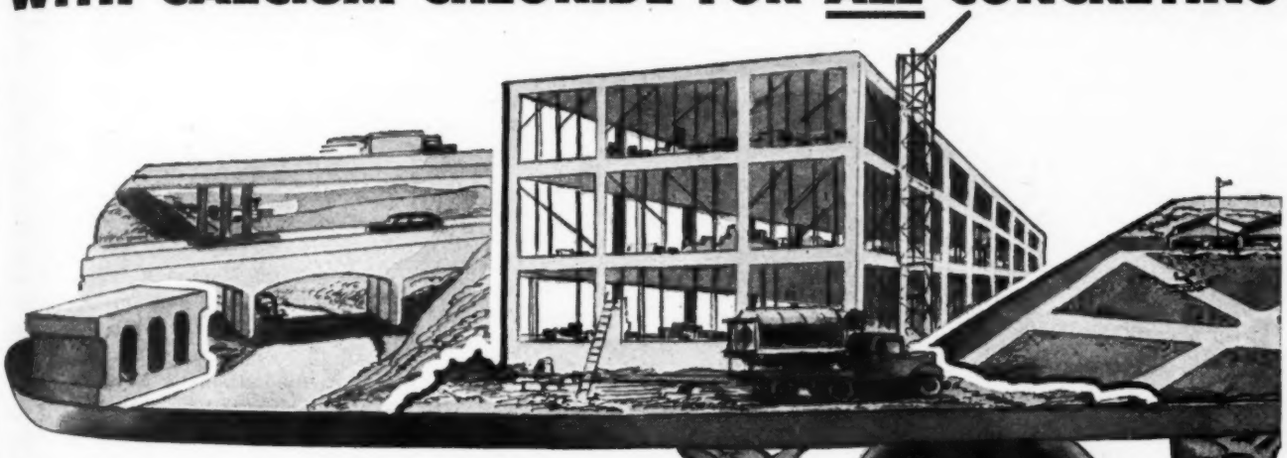
The upper four miles was built with 3 in. of road-mix, plant-mix being given up because the abrasive lava rock encountered was so hard on

Is the road-mix running 7% bitumen, or isn't it? California Division of Highways men working slide rules, from left to right: C. E. Bovey, District 10 maintenance engineer; Bert Lund, assistant to Mr. Bovey; L. H. Kahl, maintenance supt. of Amador County; W. H. Ammon, Inspector. Too late for this photo was R. H. Lapp, resident engineer

Placing bituminous topping. Note fairly easy curve, which is about the sharpest to be found on this streamlined heavy-duty logging road

HIGH EARLY STRENGTH

WITH CALCIUM CHLORIDE FOR ALL CONCRETING



MANY factories have reduced man hours of labor required to produce planes, ships and guns — sometimes 50% or more.

In war-urgent concreting it's "waiting hours" instead of "man hours" that hold up completion of concrete work. These waiting hours are reduced one-half to three-fourths by incorporation of calcium chloride in portland cement concrete mixes to produce higher early strengths.

Forms may be removed in half the time and succeeding courses placed earlier. Finishing may follow placing promptly to maintain work schedules — and the concrete containing calcium chloride has greater strength at all ages.

These advantages are confirmed in the findings of many years of tests at The National Bureau of Standards. Write us for Bulletin 28 — "Early Strength Concrete."

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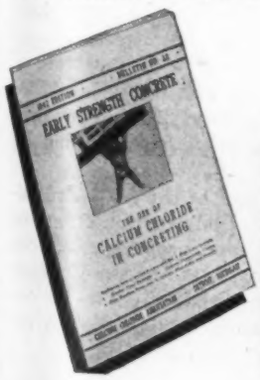
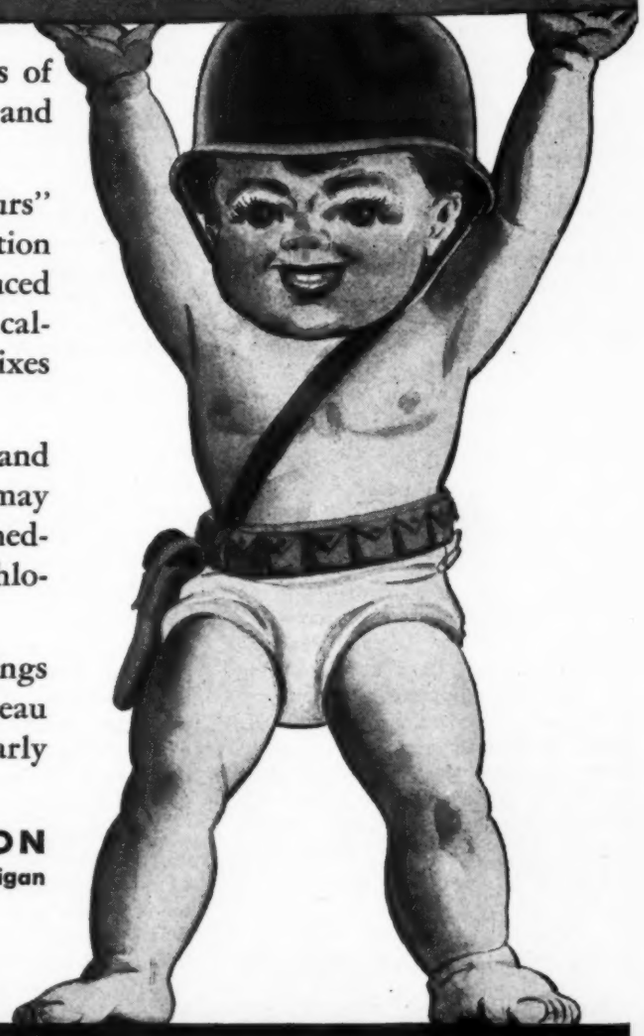




CALCIUM CHLORIDE

SPEEDS YEAR-ROUND CONCRETE CONSTRUCTION

the plant blades. The top 3 in. of selected material base was scarified and oil-processed with blades.

How Oil Content Was Controlled

The method employed to control the oil content of the mix was in line with the manufacturer's inspection manual for single aggregate central plant mixers. This method checked with the one-tenth of 1% of the laboratory test. The procedure used is described as follows:

1. Set the aggregate control gate at, say, 4 inches, run machine twenty-five revolutions, and catch all the dry material in a truck and weigh it.
2. From this, determine the dry material weight per revolution of the conveyor sprocket.
3. Do the same for 6 and 8-in. gate openings.
4. From these three weight determinations, plot a curve from which weights of aggregate for any gate opening can be interpolated.
5. The oil rate per revolution for any sprocket is known from the instruction manual. From this, determine the weight of dry material necessary to obtain a 7% oil mix (the percentage used here). From this weight of material per revolution of the counter, the gate opening is picked off the curve.

This procedure was followed on each move into a new pit.

Acknowledgments

This project was designed and constructed by the California State Division of Highways, G. T. McCoy, State Highway Engineer, under the general supervision of R. M. Gillis, Construction Engineer, and Paul O. Harding, District Engineer. The work was under the direct supervision of District X Maintenance Department, Clarence E. Bovey, District Maintenance Engineer; Bert Lund, Assistant District Maintenance Engineer; R. H. Lapp, Resident Engineer; L. H. Kahl, Superintendent. The state forces also supervised and constructed the county portion of the work with the close co-operation of the Amador County Board of Supervisors, Dan Ramazzotti, Chairman.

▼

Road Officials Meet with WPB

Representatives of state, county and city road building agencies recently concluded a two-day meeting with officials of the War Production Board for the purpose of presenting their problems concerning construction equipment and machinery. Constituting the Government Advisory Committee on Used Construction Machinery, the group discussed in detail all existing problems of state, county and city street and road construction, as well as future problems and concluded with a set of resolutions requesting further recognition of the importance of motor transport and the needs of highway agencies to maintain these essential facilities. The meeting was held under the co-chairmanship of M. B. Garber, Director, Construction Machinery Division, War Production Board and Louis Levenson of the Government Division, War Production Board.

Speaking for the government, M. B. Garber told the committee that practically all of the new construction equipment manufactured during the past year has been sent overseas and under present directives, 85 per cent of all crawler tractor and 90 per cent of cranes and shovels being made are being devoted to the military.

At the same time it was brought out at the meeting that it is absolutely essential that sufficient equipment be available on the home front for the maintenance of roads and the construction of airports, pipelines, cantonment sites and other military facilities. In spite of the many equipment problems encountered, the home front program, according to Mr. Garber, is moving ahead satisfactorily with the aid of used and rebuilt construction equipment.

Equipment Pool

Through a system of compulsory registration the WPB has inventoried more than 350,000 pieces of equipment which are kept busy through regional WPB offices which transfer idle machinery to areas where required. This procedure has been very satisfactory.

According to the WPB, 38 states are now operating under the equipment pool plan. They have set up an exchange system for parts, including a scrapping procedure which frequently obtains enough parts to make a rebuilt machine.

From now on through the first part of 1944, the chief problem will be one of maintaining adequate replenishment for military needs. Used and new construction equipment is needed in important activities related to agriculture, petroleum development, logging, mining, housing, rubber development and similar demands. Thus it appears that the equipment situation will remain critical for some time. However, it may be eased somewhat in the next six months. By this time the Army construction program should be rapidly nearing completion and a substantial amount of equipment released from such projects should be available for redistribution.

H. G. Sours, Member of the Executive Committee and past president of the American Road Builders' Association, was elected permanent chairman for the group with authority to call such meetings from time to time as may be required. These meetings may

(*Continued on page* 86)

▼

E. E. Duffy, ARBA Public Relations Director

E. E. Duffy, formerly with the Wayne County Road Commission, Detroit, and the Portland Cement Association, has been appointed director of public relations of the American Road Builders' Association, according to an announcement by Charles M. Upham, engineer-director.

For the last two and a half years Mr. Duffy was planning secretary of the Wayne County Road Commission,

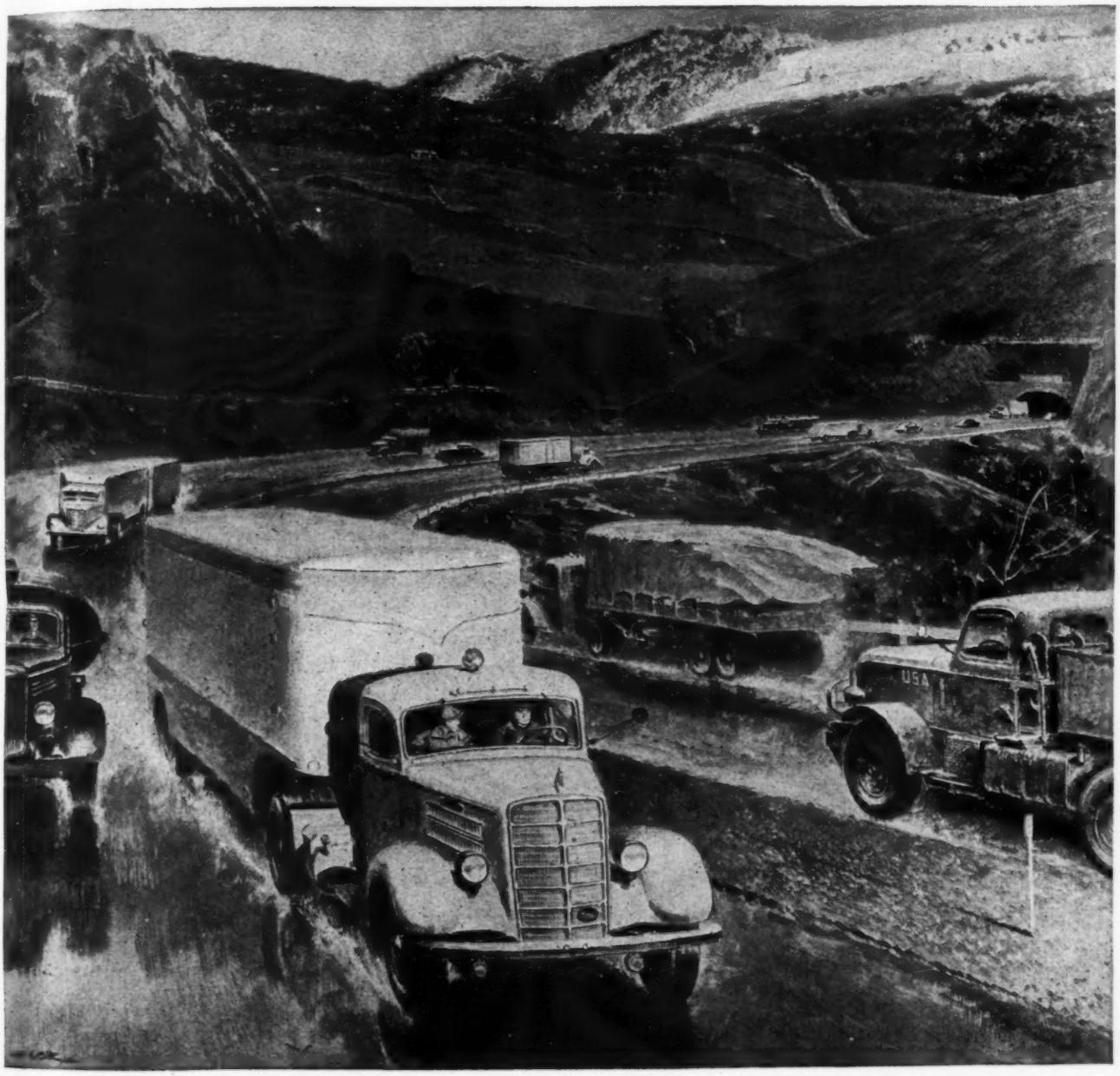
E. E. Duffy

one of the most progressive highway agencies in the country.

Prior to that he handled general publicity and later highway promotion for the Portland Cement Association for sixteen years. For several years Mr. Duffy prepared literature, supervised production of motion pictures, and wrote countless feature articles on all phases of highways.

"For many years, Mr. Duffy, in representing former connections, took an active part in the work of the American Road Builders' Association," Mr. Upham said, "serving as chairman of the anti-diversion committee and lending frequent assistance to various committees. Because of his familiarity with the work of the Association and his wide experience with highway affairs, the Association is fortunate in obtaining his services."

In furtherance of the ARBA's Post-war Highway Construction Program, Mr. Duffy is now preparing a series of publications, based on the Program proposal, for distribution to the industry, to public officials and to the public.



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Today America's magnificent highway trucking system has become the greatest production line in history—an endless chain in which over 4,500,000 trucks play their vital part in the miracle of America's war production. Either as raw material, or finished product, almost every bit of war equipment travels by truck. With truck manufacture halted for the duration, existing trucks and the men who drive and service them are doing a mighty job. Mack is doubly proud that the *extra* quality, *extra* strength, *extra* long life built into every Mack now means so much not just to Mack owners, but to the country as a whole!

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IF YOU'VE GOT A MACK, YOU'RE LUCKY . . . IF YOU PLAN TO GET ONE, YOU'RE WISE!

COLD WEATHER PROBLEMS

Last Winter and Next

IV—Battling 200 Inches of Snow in Northern Michigan

Continuing a series of "winter" articles, the following notes describe operations in one of the "deep snow" counties. Practice of another Upper Peninsula county and of the Michigan highway department will be covered in October.

The memory of last winter is still fresh in the minds of Northern Michigan road and street officials. For it was one of the worst in their history. All records for total snowfall were broken over a wide area, with three counties recording maximums of 230 inches or more, and several others around 200 inches. A region as big as some states lay blanketed with four to seven feet, and house-top drifts were commonplace. Houghton County's snow problem is among the toughest of any in the U. S.—Editors.

236 Inches in Houghton County

Houghton County's experience is worthy of special note because the county road organization at Hancock is among the most intensively organized for winter work, and because its normal average of 170 inches was topped last winter by a biggest-ever fall of 236 inches. This county, under veteran County Highway Engineer Carl F. Winkler, normally has a thousand-mile removal job, comprising about 100 miles of state trunk lines, 150 miles of county trunks, 600 miles of secondary roads and 100 miles of streets and alleys in the unincorporated mining and lumber towns that dot the county.

About 50% of the local roads are not cleared ordinarily, and this past winter the percentage was higher. Due to war shortages and restrictions the county covered only about 700 miles, and was lucky to get over that much.

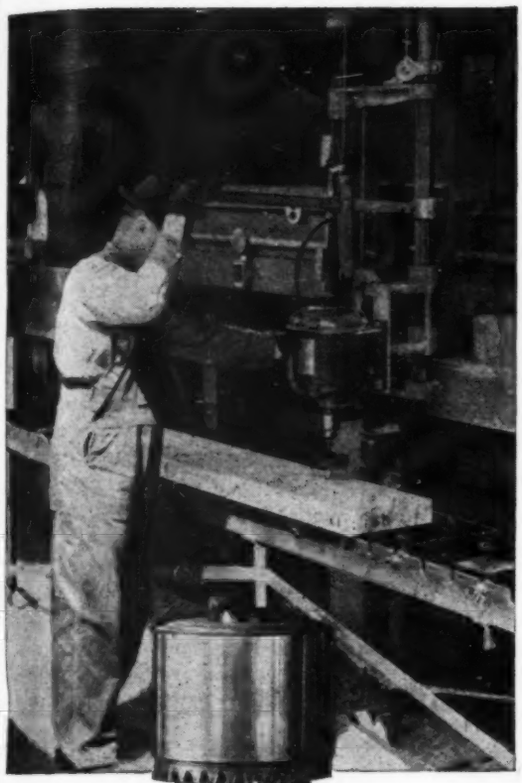
Seven Arbor-Type Rotaries Kept Busy

Among the thirty Sno-Gos serving Upper Peninsula highways, Houghton County has seven. These are the "wheel-horses" in an outfit which also includes about 15 five-ton or larger trucks, two tractor-powered displacement plows and several lighter units.

Patrol graders are distinctly a secondary machine for clearing once winter sets in, but are indispensable in the county's policy of keeping the entire snow mat cleared from pavement surfaces.

This rather limited equipment is the best the county feels it can afford, in view of the constitutional property tax limit which eliminates

Drifting is the biggest problem in Upper Michigan snow fighting. This road is being re-cleared after wind filled it entirely over. Photo winter of 1942-43, Houghton County, Mich.



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NATIONAL MANUFACTURERS OF TECO TIMBER CONNECTORS AND TOOLS

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In the path of the Sno-Gos. Houghton County road as it looked in March, 1943, before the banks were raked down

local road funds, and the modest sum ($60,000) allocated for state roads from state gas and license funds. It proved painfully short last winter.

Last winter's drifts frequently topped 20 ft., and the county crew of 50 to 60 men worked the clock around in two 12-hour shifts as long as human endurance could stand. Heavy packing snow was encountered in late spring storms, necessitating double and triple header operation. Plowing operations differed every day. On some days the problem was "sugar snow" which would fall right back in the cuts. Drifting as usual was the over-shadowing problem (see photos).

Last winter's dirty work began early. November 26, Thanksgiving Day, it snowed 12 inches. The next day, 6 inches more, resulting in quite a tussle. On December 2 and 3 came 18 inches, and on December 10 and 11, 15 inches. During December 64.6 inches fell at Hancock on 24 different days, with temperature below zero much of the time. There were nineteen sub-zero days during the winter, lowest being —32. From November 1 to April 30, 1943, 200 to 236 inches fell over much of the county, falls occurring on 95 out of 181 days.

This compares with the previous relatively tame statistics for two towns in the county:

Snowfall History of Houghton County, Michigan (Inches)

	Painesdale	Calumet
1926-27	151.5	108.5
1927-28	157.7	166.48
1928-29	115.0	115.5
1929-30	160.0	125.50
1930-31	111.8	81.30
1931-32	142.8	92.00
1932-33	156.0	115.45
1933-34	159.6	124.75
1934-35	157.6	146.50
1935-36	148.4	177.45
1936-37	186.8	191.00
1937-38	134.5	127.25
1938-39	190.9	226.00
1939-40	136.7	172.00
1940-41	148.5	169.50
1941-42	146.2	146.80
1942-43	231.1	208.00

Concentrate on the Main Job

As is common practice elsewhere, all available equipment is concentrated on arterial roads as soon as a storm begins. Little attempt is made to keep traffice moving on secondaries during the storm, except in emergencies such as the rescue of school buses, etc.; these roads are opened up as soon as possible after the storm has abated.

When the storm is over, then comes preparation for the next one. The plows and rotaries get in and eliminate windrows pushed up by the displacement plows, wherever possible cutting roadside snow down to the depth of cover on adjoining fields. Wings are used to throw out bank tops. Narrow, deep cuts are widened

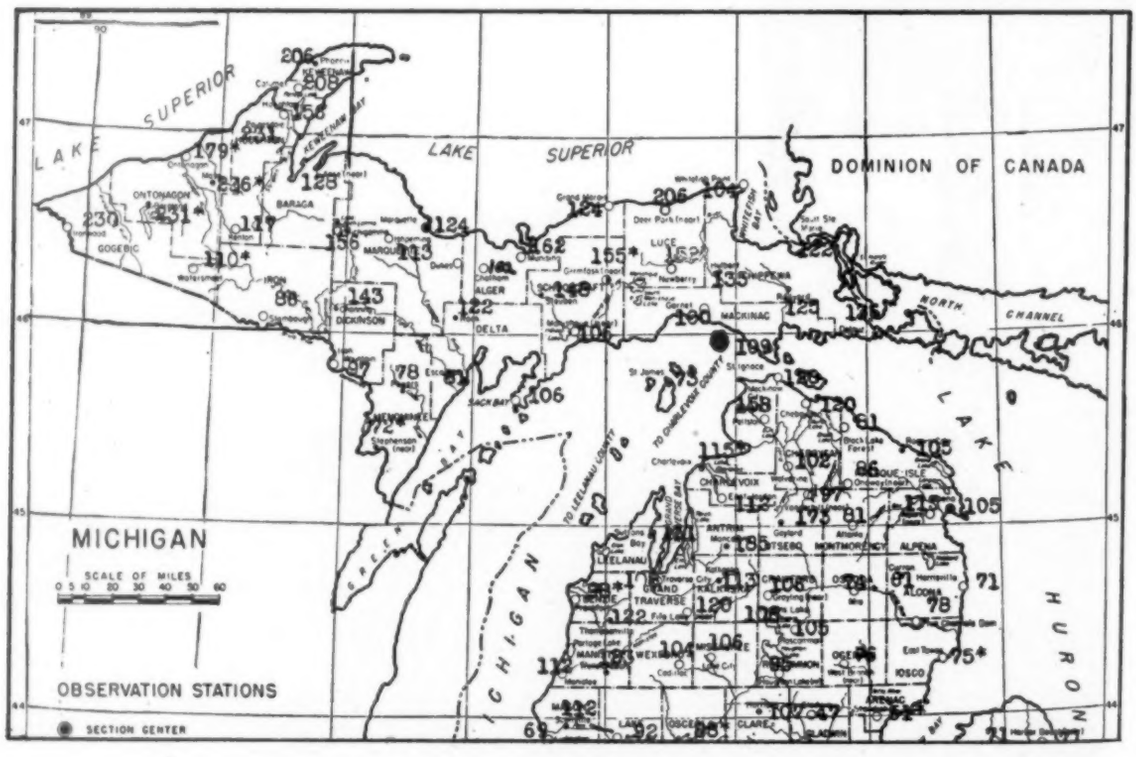

Fig. 1. Depth of the record 1942-43 snowfall in Michigan

For SEAL COATING and ICE CONTROL with fewer men at less cost

The FLINK Spreader

The Flink self-feeding spreader is strictly a one man outfit. Operated by driver of cab, who can throw spreader into action as he rapidly approaches, crosses and leaves intersection. Then it can be thrown out of action. Flink spreads forward or backward, full width of street, or less than half width. Handles sand, cinders, etc. up to 1" in size, wet or dry, spreading evenly up to 35' width. Does not limit use of truck for other purposes as Flink spreader fits on end as a tail gate. Positive agitation, no bridging. Flink spreader will pay for itself many times over the first year in labor saved, in extra yardage covered and reduction of complaints.

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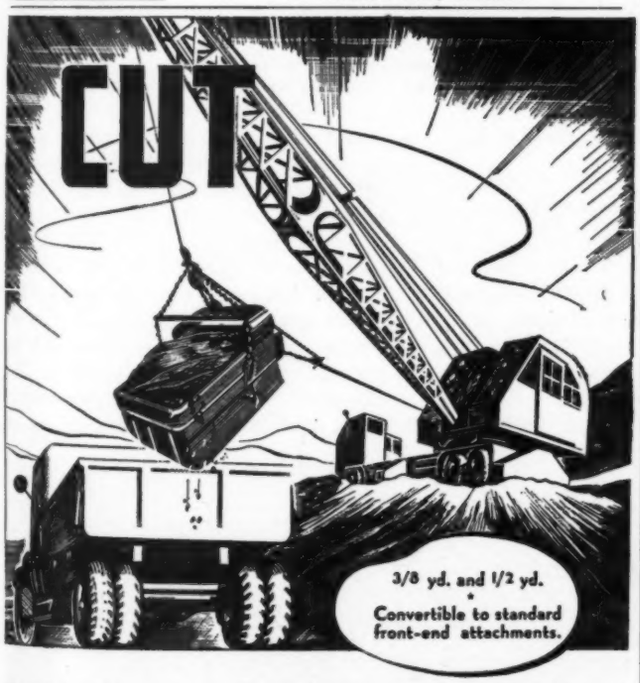

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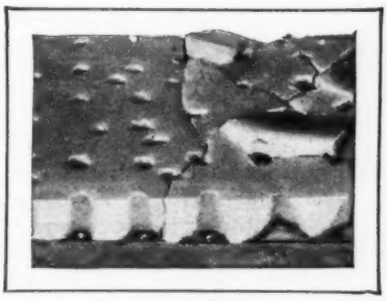
STOP WINTER SABOTAGE OF VITAL TRAFFIC!

When Storms Strike in your area . . . they must not be allowed to tie up vital trucking of war supplies and other essential traffic. And they needn't! For you have a sure ally against snow and ice in Sterling "Auger-Action" Rock Salt. Applied early in the storm, it prevents snow from packing and bonding to the pavement—makes complete removal easy. Keeping pavements *bare* this way is safest. Tests show that it takes 2½ to 7 times as long to stop a car on ice as on bare pavements!



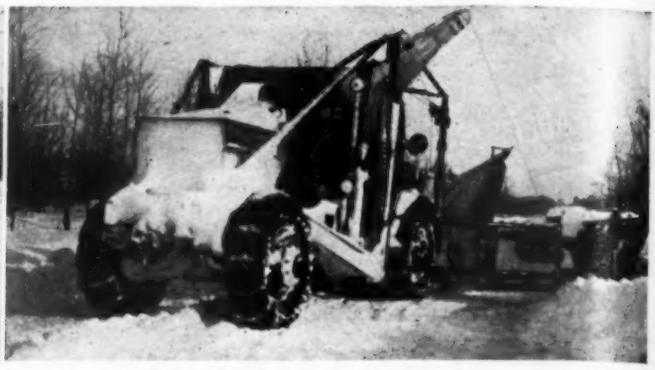
But What Happens if ice has already formed? Sterling "Auger-Action" Rock Salt is still your best bet. As the model here shows, it digs in fast. And forms a brine with the melting snow and ice, loosening their bond with the pavement. Thus loosened and honeycombed, the snow and ice can easily be removed by scraper and plow. Further, when straight Rock Salt is used, it eliminates the cost of cleaning streets and catch basins which ordinarily become clogged with sand and cinders during thaws!

Sterling

"Auger-Action" ROCK SALT

FOR ICE PREVENTION

Highway Departments have shown savings of ⅓ to ½ by using Sterling Salt for ice prevention. Write today for bulletin containing all the facts on the most efficient and economical solution to your snow and ice removal problems. Free consultation with an International Field Engineer upon request. International Salt Company, Inc., Scranton, Pa.



Left: Houghton County equipment winging out to the ditch lines. Right: This heavy-duty outfit is equipped with just about everything including a wing and front-end plow for taking a fifteen-foot swath in light snow

with snow throwers. And, most important, remaining vertical banks are cut down by "reverse winging" and snow dropping into the road is thrown out either with rotaries or with high-speed truck plows.

Mr. Winkler's way of opening up a blanketed or drift-filled road is described in his own words: "First, we *hit* it! We go in and back out and go in 4 or 5 feet at a time, and keep widening or we're soon stuck. But we don't like to push any more snow than is necessary, but rather throw it. For that reason we wing extensively, nipping the bank each time. In our experience a saucer cross-section is to be preferred over vertical banks. In reverse winging we often use two trucks.

"At times last winter, vertical banks became packed so hard that trucks could cut in only a foot at a time at 5 m.p.h. In knocking down banks with a rake or slicer the important thing is to keep the rake in the bank. Several trips through with clean-up plows are necessary."

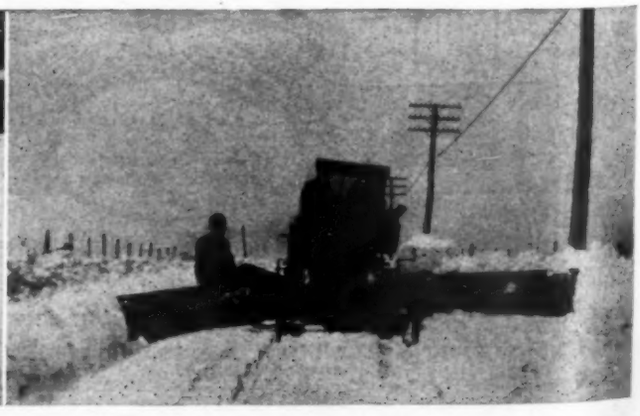
In Houghton County one sees heavy equipment being efficiently used for light snow removal. Five-ton trucks are equipped with 12-ft. wings to utilize them effectively. Equipped with a 10-ft. two-way plow and 12 ft. wing these trucks can easily clear a 15-ft. path early in a storm.

When snow is this deep, removal or removal preparation is an all-year job—and a vital one if schools and mines are to keep open and normal life to continue. (Keweenaw County, Mich.)

Snow Fence Also a Wartime Problem

Houghton County's 60 miles of snow fence includes about a quarter-million feet of typical 4-ft. wood fence. This fence soon becomes buried, and the peacetime practice has been to lift every foot of it out and reset at a higher level. Today the problem is to get labor for this work, as well as for the initial setting up and taking down. Farmers, also short handed, were asked to help, being paid the equivalent of ¾-1 cent per foot to take fence down and store it.

Some ten years ago the county began a study of the value of higher fences, and today counts itself as perhaps the only county which has extensive 16 and 18 ft. permanent fence installations. This consists of



Left: One of the old time outfits (no longer in service), this Pierce-Arrow limousine was long on elegance but short on traction. But it played its part in an equipment evolution that is still in progress in Upper Michigan. Right: Another pioneer plow. Note its ambitious width! Snow roads and sledges, or just hibernation, were part of life in the North Woods until rigs like this started to come along

MAKE FULL INSPECTION A REGULAR ROUTINE

Even if your rope is long-enduring

HAZARD **LAY·SET** *Preformed*

Both steel and production time are critical. Save both by regular inspection of your machines. Look especially to your wire ropes that operate them. Wire rope is expendable. Take care of it in order to receive its full service. And this applies to all ropes including **LAY-SET** Preformed, for while **LAY-SET** outlasts ordinary non-preformed wire rope, it too will respond to proper care by lasting *still* longer. Here are a few suggestions:

- Clean and lubricate all ropes regularly. Be sure hemp core is not dry or corrosion or collapse may occur. Tighten fittings.
- Be sure you are using the proper rope for the service. Consult your Hazard representative. He will be glad to give you the benefit of Hazard's 97 years of experience.
- If sheaves or drums are critical diameter, specify Hazard **LAY-SET** Preformed because of its high fatigue-resisting quality.
- Be careful of the fleet angle. Don't let the rope deviate more than 1½° from center plane of sheave or excessive wear will result. (Note how this condition is beginning to start in this picture.)
- Don't allow bad spooling for crushing may result. Hazard **LAY-SET** Preformed spools much better than most ropes.

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HAZARD LAY·SET WIRE ROPE

Sno-Go receiving a little manual help

A Houghton County farm-to-market road, improved early this year with an eye to reducing snow removal cost. Grade was raised, ditches widened for greater snow storage, fences set back, and back-slopes streamlined and cleared of weeds and brush. Surfacing is mine rock

pine boards (1x4) nailed to cross members and supported on posts. About a half-mile is in service at very bad drift points and has proved effective.

Another type of high fencing consists of two rows of 4-ft. fencing, one over another, suspended on galvanized wire between wood posts. Three miles of this is doing okay, as is about two miles of double-deck-8-ft. wood fence, which is more effective than two parallel lines of 4-ft. fence.

With fencing unobtainable today, much of this mileage is in need of replacement. The county however has made steady progress in keeping drifts out of the highways, either by streamlining the bank slopes, widening ditches, raising grades, etc., or by progressive planting and development of roadside trees and shrubs.

Over 600 miles of roads within the county have been built up in the long years of Winkler's direction. The present policy is to keep a balanced point of view, since no amount of fence can take the place of a first-class heavy-duty mechanical fleet.

Making Equipment Do

Last winter's high percentage of idle equipment due to lack of parts (30% or more) was due to a policy which in normal times has been well justified, namely, that of utilizing older trucks on Sno-Gos to keep down new-equipment outlay for any one year. Some of the trucks used last winter date from 1927 or earlier.

But age is no criterion of trouble now. One modern 7-ton truck saw only two days' service last winter. Reason: parts.

During the 1943 summer the shop men not only gave every machine an extra thorough overhauling, but they also restored two old retired rotaries for emergency use.

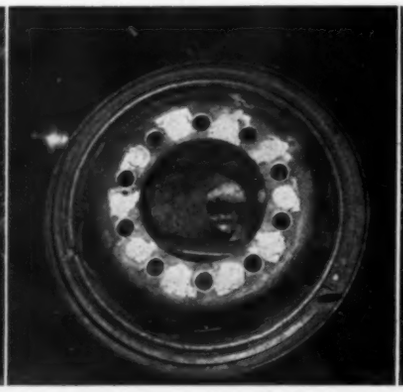
And overhauls were really thorough. For example, a typical Sno-Go routine involved the following items:

1. A new motor block was installed (old one cracked).
2. General motor over-haul included regrinding crankshaft and truing all new bearings to standard undersize (.020 in. under), which was done on a Landis grinder in a local machine shop.
3. Sno-Go motor was given routine check-over and found to be in excellent condition.
4. Generator was checked and found to need new bearings. Bearings installed, armatures washed and painted over.
5. Wiring checked all over the outfit. This is considered an important detail, since wires get torn with plow equipment. The mechanic looks for loose connections caused by vibration, for example by a cab that has gotten loose and resulted in a poor ground.
6. Wheels are checked for cracks. Worn lug bolt holes are filled in with welding metal and new holes drilled in the interval between. Even slightly worn holes are recognized as a sign of trouble ahead.
7. Transmission and rear-end were torn down and rings, pinions and other details checked or replaced in a thorough overhaul.

On all trucks special care was given to adjustment of bearings. Welding and blacksmithing equipment was kept going overtime much of the summer. Sno-Go arbors are built up and hard-faced; bits, teeth and blades were likewise restored and treated to prolong their life. More than a score of complete plows or wings were built in the shop.

Engineer Winkler and his able assistant W. L. Kaiser aren't worried about the coming winter. Before the war they had built up their fleet and taken advantage of the sturdy, well designed equipment developed by

Another money and metal saver: building up Sno-Go arbors with hard high-carbon steel stock. The welder tackwelds at intervals and then welds continuously on both sides. Edges are hard-faced when materials are available



An important detail of truck maintenance in Houghton County is the practice of welding over all worn bolt holes in disc wheels and drilling new accurate holes in the intermediate spaces

Salvaged truck wheel (International 2 which the Houghton County shop fixed up after the drum faces had wo been ground through the recessed shou Recessed places acetylene bronze wel

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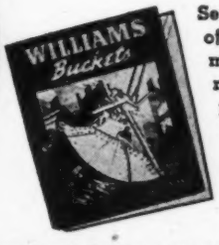

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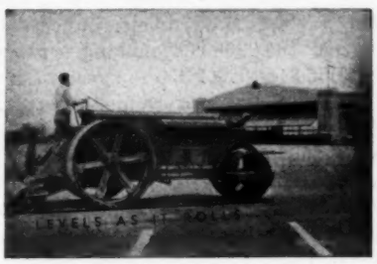

HERCULES ROAD ROLLERS

Keep the engine and all moving parts clean, well lubricated and adjusted. Send for HERCULES Care and Operation, Bulletin H-3713.

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manufacturers to fight snow. And quite a few of experienced operators have stayed with the county. The snow fighting job finally depends on the men, Winkler will tell you.

A good truck driver isn't necessarily qualified to steer fifteen thousand dollars worth of snow equipment through a blinding storm. Winkler has spent years out on the trucks training his drivers, teaching them self reliance and helping them develop judgment and skill that has stood the county in good stead. Winkler goes on the theory that snow removal isn't just a highway maintenance job. It is a vital part of the picture of life in the North, and an essential factor in the existence of consolidated schools which have brought up the general level of education and enlightenment.

Special Motor Vehicle Taxes Yield Big Sums Even Under Restrictions

Despite gasoline rationing along the Eastern Seaboard and later over the entire nation special state motor vehicle taxes for highway purposes totaled $1,316,043,000 in 1942, not including receipts from tolls.

This compares with $1,485,814,000 paid in similar levies in 1941 and includes $845,179,000 in state motor fuel taxes, $448,968,000 in motor vehicle registration fees and $21,896,000 in motor carrier taxes and other special fees.

In addition to state highway user taxes, motor vehicle owners paid special Federal Government imposts in 1942 of $631,268,000, making a grand total of $1,947,311,000 in special State and Federal motor vehicle imposts. Federal levies last year compared with $568,225,000 paid in 1941 and include $303,016,000 paid in gasoline taxes for highway use, $26,353,000 from the Federal tax on lubricating oil used in motor vehicles, $91,741,000 in Federal excise taxes on motor vehicles, tires, tubes, parts and equipment and $210,158,000 from the Federal motor vehicle use tax.

Federal officials expect 1943 motor vehicle revenues will represent the largest war-time tax casualty and although it is predicted that state motor vehicle license tax collections will decline during the war, it is not considered probable that a severe change will be noted this year.

Tax payments listed above are exclusive of special motor vehicle levies by counties and municipalities and certain contributions to state and local governments made in connection with motor vehicle ownership and operation.

Portrait of a Snow Fighter

They Call Him "Wink"

Dean of the snow fighters in upper Michigan is Carl F. Winkler, County Engineer of Houghton County, Michigan.

Winkler, who was born in Saginaw, Michigan, fifty-eight years ago, first started out to be a miner, graduating from the Michigan College of Mining and Technology at Houghton in 1910. One of his first positions was with the Winona Mining Company near Houghton.

It was while Winkler was busy attending college, that because of his popularity he was given the name of "Wink", and as "Wink" he is known today by his fellow road-builders and friends throughout the State.

Carl F. Winkler, at left, inspecting a drag magnet's haul on a Houghton County road last spring. In 12 miles of shoulder along concrete pavement, 37 lbs. of tire murdering material!

His success in highway work can be attributed to the fact that he started the hard way. He gained his experience, first, as a surveyor in Gogebic County, when roads that today form a ribbon of highways connecting with every important route in the country, were merely old logging or Indian trails.

Consider the fact that not long ago only Indians canoed or stalked through Gogebic County lakes and forests seeking wild game, blazing the first trails and foot-paths, and you have the answer that the establishment of highways in the early days in this Upper Peninsula of Michigan had to be performed by rugged, foresighted men like Winkler. In 1917, Winkler, became County Engineer of Gogebic County and in that connection was instrumental along with present county engineer, George W. Koronski, in building up the splendid highway system that Gogebic County now boasts.

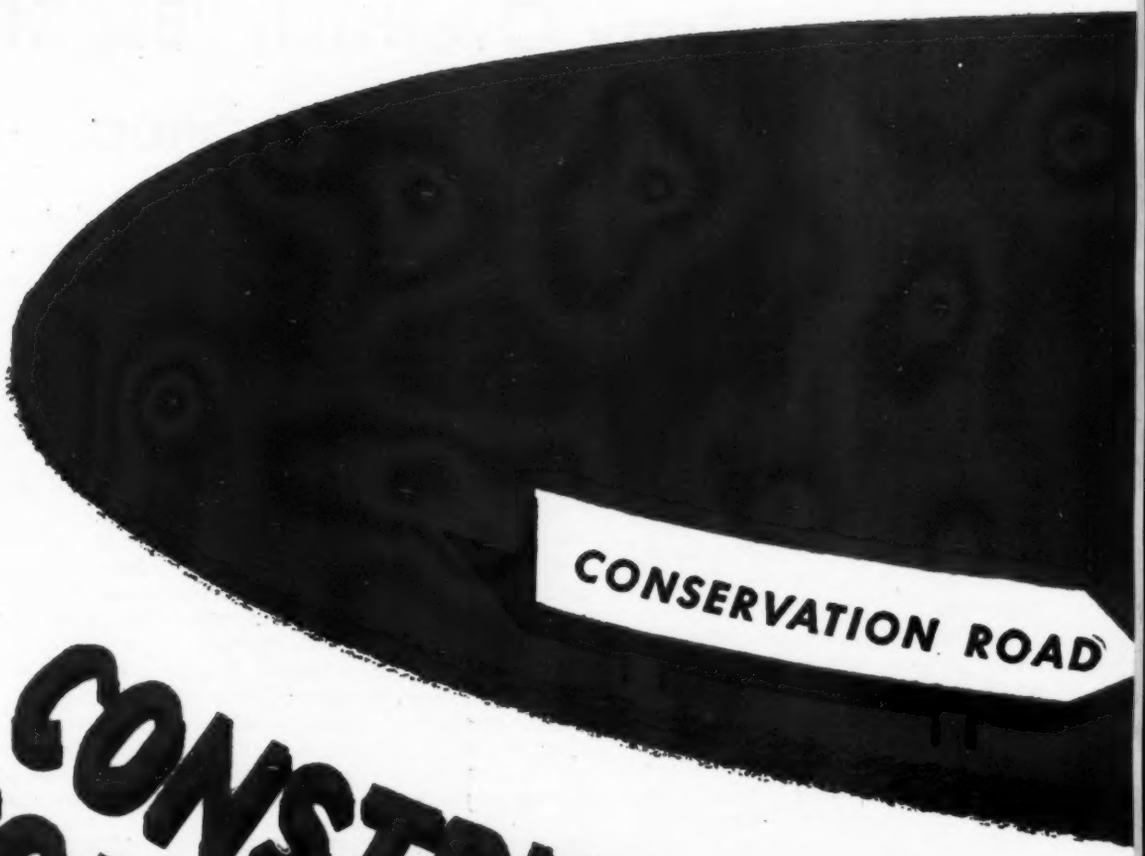
In 1930 Winkler became County Highway Engineer for the Houghton County Road Commission, the position he now holds. Because of his experience, he has held numerous offices with highway engineering and contractors organizations throughout the State; and through his efforts in this connection much legislation was designed and later approved by the Law makers at Lansing that has aided in the State's highway development. This is especially true in the Upper Peninsula of Michigan where numerous counties have lost their sources of revenue from taxation because of the abandoning of iron and copper mines, or the cessation of logging operations.

Carl Winkler's outstanding work, however, is snow removal, the development of machines and methods to help people in his area get about in winter almost as they would under normal summer conditions. The North country's vast amount of snow has required much planning as to the equipment needed, the safety of the traveling public, from the safety of children getting to and from school, fire, medical and other public services.

Winkler agrees that if he had only snowfall to contend with, it would be a picnic. But when you have snow like Houghton County, coupled with a gale seventy-five per cent of the time, the trouble never ends. It requires constant supervision of those in charge, and it is in this capacity that Carl Winkler never shirks. Regardless of the storm, and whatever the emergency may be, you will find "Wink" out there battling the blizzard side by side with his plow operators.

"Wink" also finds time to help his many friends enjoy themselves. He is a lover of boats and loves the woods. As a hunter he excels in the pheasant hunt and each year provides enough pheasants to feast his many followers. Once an ardent golf fan, he has in recent years forsaken this favorite sport and now when he is not plowing snow or building a highway, you will find "Wink" out renewing his acquaintances with the citizenry of Houghton County.

Care and Repair in Shop and Field



CONSTRUCTION EQUIPMENT MAINTENANCE

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Equipment Maintenance

How Army Overhauls "Big Stuff" at Fort Logan Shop

AT Fort Logan near Denver scores of welders, blacksmiths, machinists and other repair men are busy reconditioning "X" carloads of army construction machinery in one of the most modern and best equipped shops of its kind in the country. The Fort Logan shop is one of two operated in the area by the Ed. H. Honnen Construction Company, well known Colorado earth moving contracting and road building firm, which is performing the work as contractor under the eagle eyes of the Missouri River Division of U. S. Engineers.

This shop in turn is part of a national program whose techniques, it is hoped, will be more fully revealed to road contractors and highway departments after the war. In full swing for many months now, scores of government-owned shops and shops of equipment distributors throughout the country have been reconditioning vast quantities of army construction machinery, preliminary to transfer to other uses. Much of it by now is abroad. The Fort Logan shop is one of several under the U. S. Engineers' Missouri River Division at Omaha.

Only "heavy" equipment other than trucks is handled at Fort Logan, trucks being handled in a separate government-operated shop in Denver. Track-type tractors, wheel tractor-trailer units, bulldozers, scrapers, patrol graders, shovels, draglines, cranes, pullshovels, dippers, buckets, ditchers—these make up the bulk of the work here, although early in the season a quantity of mixers, compressors and miscellaneous smaller units were handled.

Machinery brought here is rounded up from everywhere in the region, some coming from completed airbase and other military projects. Some are units brought in for fixing up and sending back to western jobs still in progress.

Work Highly Departmentalized

The layout at Fort Logan, which cannot be fully detailed at this time, includes a cleaning shop, a tractor shop, a grader shop, an outdoor "line" for cranes, shovels, draglines and other big units, an engine room, machine shop, welding shop, and blacksmith shop. Also individual rooms for batteries, electrical work and tires, and a parts storeroom that would be the envy of any highway department or big contractor.

Whereas in smaller repair shops all types of repair work is usually handled in one or two rooms, it was found best here to keep each function strictly separated in a special shop to expedite volume handling. For example, except in special instances when a portable welder is trundled out to work on, say, a heavy crane casting in the yard, all parts to be welded are taken into the welding shop.

Overhaul "Flow Path"

Equipment arrives at the depot by railroad flat car or road convoy and is immediately placed on the "lines"—tractor line, grader line, etc.—and inspected. Inspection determines whether reconditioning can put a unit in good enough condition (good-as-new) for overseas duty, or for domestic construction or training use, or for post maintenance. There is a definite mechanical standard for each class of duty. The first step then is to decide what parts can be salvaged by repairing and to list and order new parts needed to fit the unit for its assigned class of duty. And a date for overhaul is assigned, the time being set ahead with due consideration of the probable delay in getting the parts involved.

Reconditioned and loaded for shipment, this equipment is part of many millions of dollars' worth overhauled this year in scores of U. S. Army or army-operated shops

"Master Bins" for Parts

Each unit on inspection is assigned a code number, which is carried through all office and shop routine. That number, say 9730, is chalked over a "Master Bin," one of a long row of such bins. As parts for various machines arrive from the factory, or are made in the machine shop or obtained as salvage or exchange from other like units, they go first to the parts stock room. There they are sorted and the parts for unit No. 9730 are tagged and thrown into the No. 9730 Master Bin. As soon as all parts arrive (sometimes sooner) the overhaul routine begins.

First—A Wash Job

Every repair or overhaul job, whatever its class, starts with a thorough cleaning. Pressure steam and solution (no gasoline) usually suffice, but a large amount of sandblasting also comes into the picture, to remove paint, hardened concrete (as in mixer drums) and other stubborn material.

Then the unit goes on to the line. Tractors are taken to a spacious 80x130 ft. building, taken over from the Ordnance Department of the Seventh Service Command. The machines are dismantled with the aid of overhead cranes, portable chain hoists and other speed-up equipment. Motors needing attention go to the motor room adjoining, and other parts go to the welding shop, machine shop, or other specialized shops as needed.

The tractor shop equipment includes the most modern hand tools. A power track bolt tightener was built to speed up truck overhauling.

The motor shop has motor benches for handling a large number of units at once, and modern specialized valve grinding and other equipment.

The machine shop, also located close to the tractor building for convenience, includes several sizes of lathes, drill press, planer and shaper, power saw, grinders, etc. Wall bins and racks are provided for bronze bushings and other machine-made parts and for temporary storage of parts going in and out. All cuttings and filings are salvaged. No metal bit, however small, is lost.

The welding shop employs, on an almost unprecedented scale at times, all the salvaging and rebuilding tricks that have been learned with electric and acetylene welding. This section, like the others, is noted not so much for any Simon-pure novel or new techniques (although there are several) as for the thorough and efficient application of well-known methods. One of the big-scale jobs, that of building up and grinding track rollers, is handled on a production-line basis. A special holding device has been built for holding rollers against the emery wheel in finishing.

Every rubber tired machine finally reaches the tire department, where rubber gear is inspected. Worn tires still good enough for further service for the assigned duty are left on, or transferred to other units. New tires are usually installed for overseas duty. The tire department, which handles principally big, bulky graders and wheel tractor units, is laid out to include three installation bays under a single roof, new tires being stored in a fourth end bay.

Outdoor Repair Work

Because the clean gravelly soil around the plant creates little dust, it was found practicable to overhaul shovels, cranes, ditchers and other big units out in the open during the summer season. Planks cleated together into 5x16 ft. portable outdoor floors are thrown down alongside each machine, to furnish a clean place to set parts and tools. Tent-enclosed tool benches are spotted at intervals among the machines, in a flexible arrangement which can be changed from day to day according to the number and type of equipment on the outdoor line.

Cleanliness, Plus

Henry Ford's famous cleanliness and orderliness hasn't anything on the Fort Logan Shop. Sweepers are at work all the time keeping the concrete floors spic-and-span. Benches and tools, too, are kept clean. The Army knows that it pays on precision work.

Safety is another watchword. A fire truck is kept always in readiness. The Army regulation, "no vehicle parked within 25 ft. of a building" is in evidence. In a small first aid building, a nurse is on hand at all hours.

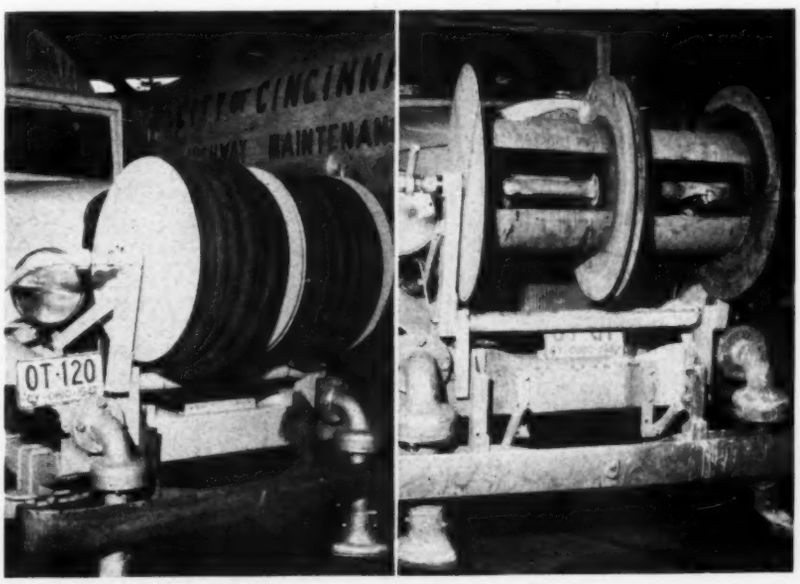
Final Inspection

After overhauling comes final testing. Motors are put on the block for test runs. Scrapers are put through actual earth moving operations and their performance checked. This work is under the direction of a government testing inspector and his aide. When declared OK, the unit gets another washing and are blocked on flat cars for shipment. There goes another olive drab tractor for the Mediterranean, the South Seas, Alaska, who knows where!

Handy Hose Reel Made in Cincinnati Shop

Devised as part of a special decontamination truck for civilian defense, the dual-drum hose reel shown in the accompanying photos has many possible applications. Water or other liquids is pumped from the truck tank (or other source) via a pipe line which extends through the reel shaft. The hose on the reel couples with the pipe via a welded threaded lead-off pipe seen at the right.

The reel was designed and built in the Cincinnati municipal shop by the city's Highway Maintenance Division, C. E. Brokaw, Superintendent.



Shop-made hose reel before and after putting in service.

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GEMMER STEERING demonstrated its worth in all types of peacetime automotive vehicles from lightest passenger cars to heaviest buses, trucks, roadbuilding machinery, and agricultural tractors. An equally commendable job is being accomplished on wide variety of vehicles and boats for our armed forces.

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Complete Tear-Downs Feature of Colorado's Preventive Maintenance Program

By AXEL SWANSON
Assistant Supt. Maintenance
Colorado State Highway Dept., Maintenance Division, Div. 5, Denver, Colo.

THOROUGHNESS in inspection and overhauling, with special attention to keeping motors sweet running, is a feature of the Colorado State Highway department's equipment maintenance. The department was fortunate in having a well-built-up fleet when war broke out, and in possessing self-contained shop facilities in each of its seven widely scattered districts. Self-sufficiency in the various districts is an old story in this rugged state of big distances.

Equipment upkeep comes under the state maintenance engineer. The foreman of each shop works in close cooperation with a state equipment inspector, who operates out of headquarters to coordinate the work and see that district methods are kept in line with latest practice.

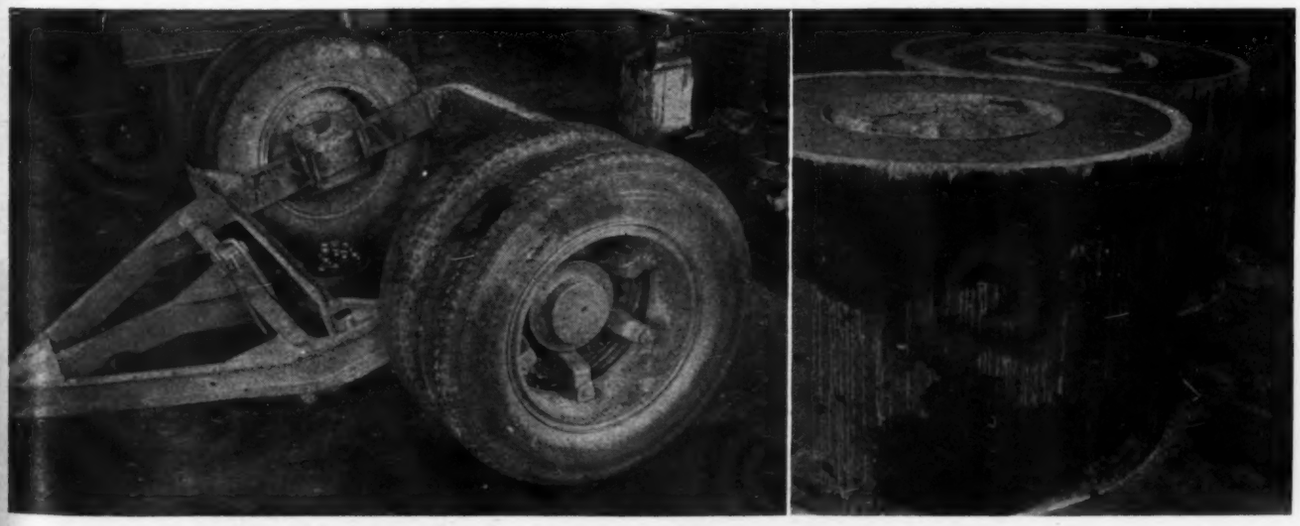
Complete Tear-Down Is General Policy

There is no "overhauling time" as such; torn down machines may be seen on the shop floor any month of the year. And when the Colorado shop men "tear down" a piece of equipment, they are instructed to do so in the literal sense of the word. Although hampered of late by the shortage of parts, the policy of thoroughness in overhauling is still the kingpin in the state's preventive maintenance program. Many a motor that sounds and runs well is headed for early trouble because of some hidden defect; a complete tear-down of course costs more than just fixing the trouble that sent the machine to the shop. But the hidden cracked bearings, small out-of-adjustments and other lurking defects thus uncovered save costly breakdowns later. Forestalling such troubles more than compensates for the extra overhaul expense, in our experience. Today it is a cheap form of life insurance for irreplaceable equipment.

Dist. No. 5 Shop Equipped to "Do Everything" to Motors

Typical of the seven Colorado division shops, is the Dist. 5 shop on the outskirts of Denver. While this shop is tooled for all types of work, its motor overhauling department is

A sprinkler outfit in the making in the Colorado state highway shop at Denver. The welded frame will carry a pump motor. The tank was purchased from the City of Denver.



Tow-type roller unit being adapted for heavier duty and equipped with rubber-tired wheels for dead haul. At right: roller drums after filling with concrete.

of particular interest. Equipped for doing a complete job on all types of truck and passenger car motors, its facilities include the following units, some of which are specially built and will be briefly described:

Main Bearing Line Boring Equipment

This includes a complete outfit of tools (Kwikway), which are kept mounted on a handy rack built into a home-made portable wooden bench case (see photo).

Boring is done on a specially built line boring stand, which comprises a purchased boring bar drive; a shop-made flexible-drive, designed to fit this outfit; and a frame made from scrapped parts. This frame (see photo) is a good example of the war-time salvage efforts of our shop men. Note that the adjustable clamp which holds the vertical post of the drive unit consists of an old connecting rod bearing cap and base, welded onto the frame. There is a similar clamp at the other end. The movable bed which supports the motor during work utilizes old mine-car wheels and rail. The castor rollers consist of discarded bearing units (which have been used in many places, as noted in succeeding paragraphs).

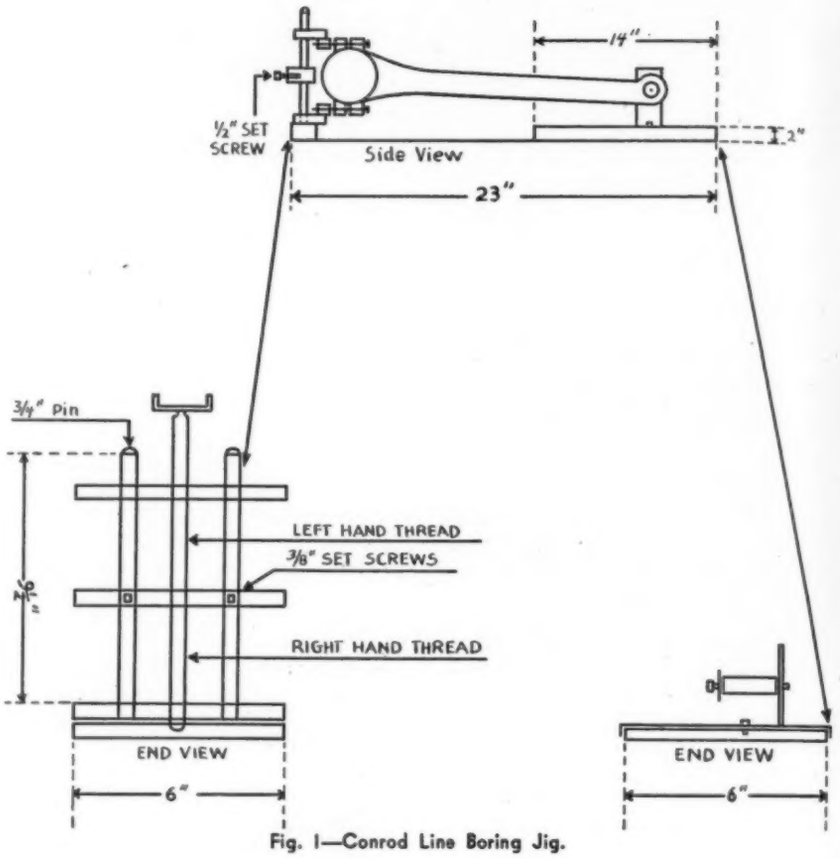


Fig. 1—Conrod Line Boring Jig.

Other Precision Motor Repair Equipment

Our motor department also has a Kwikway valve refacing machine; a Van Norman boring bar, which is kept in a special dustproof wooden bench case when not in use; a Kwikway valve seat grinder; valve seat inserting machine of same make; an overhead-suspended hand drill (Sioux) operating a Sunnan cylinder hone; Sunnan crankshaft grinder, lathe-mounted; Sunnan wrist pin bushing hone or grinder and rack for complete tools and attachments; Black & Decker bench drill; also general-purpose machine shop equipment including a champion lathe (10-ft. bed) and a Sebastian lathe (8-ft.); milling attachment for lathe; drill press, power saw, pedestal grinder.

Welding is done with a 300-amp. Lincoln arc-welding outfit, mounted on a truck which stays in the shop several months each year, a 150-amp. Lincoln vertical type arc-welder, and an acetylene outfit.

Renovating Connecting Rods

Precision methods have been applied to salvaging of connecting rods. Very often when rods are rebored and rebabbitted in general practice, the babbitt is not of uniform thickness all around. Our men are able to do perfectly concentric boring and rebabbitting, aided by a home-made connecting rod boring machine and a home-made jig for rebabbitting.

For any shop handling a volume of motor repairs, especially today, it is strongly recommended that jigs for this work be built if not already on hand. Any resourceful machinist or mechanic can rig these up. One of the above-mentioned jigs is shown in the accompanying sketch (Fig. 1). A blank rod is set up on the jig, then it is centered and kept at one position for rebuilding a complete set of rods of one type. Extra overhauled rods are kept in stock for various truck models. We have also had to devise a special jig for boring to rebush transmission case bearings. A common trouble with our trucks is for case bearings to get loose, causing the case to wobble and shimmy. When that occurs, there's just one thing to

Stand for line-boring main bearings, and tool chest in connection. See accompanying article for details of stand construction, using scrap and dis carded parts.

Another 100% shop-made item—also from scrap (again, note bearings used as castors).

More use for old bearing units—see arrow.

do, and that is to rebore the case, put in a new sleeve, and then bore the sleeve to fit the bearing.

In Spare Time—Salvage, Convert, Build Needed Machines

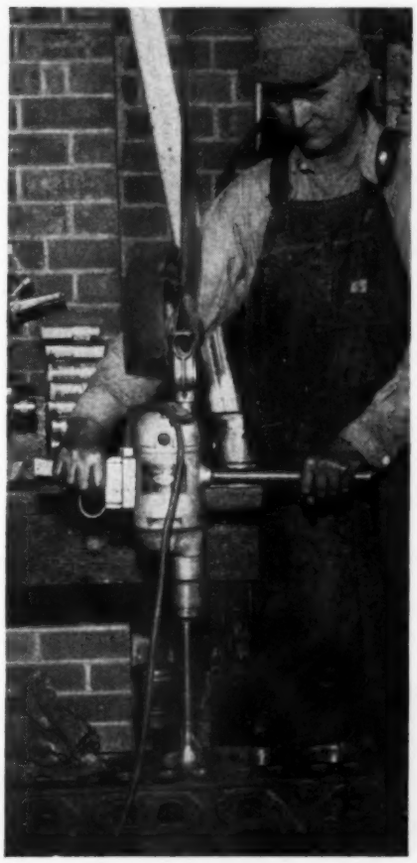
While the main job of the shop men is to keep our standard equipment running, slack hours here and there have been used to good advantage to rig up additional equipment. Some of these units have saved the state considerable money. Others are badly needed pieces not readily obtainable today. For example, one of the most popular and useful machines in our district is a home-made tractor-mounted dirt loader. This front-end vertical lift unit embodies a front-end drive built onto the tractor, a home-made cone clutch and the differential taken from a Model A Ford. We're getting a much needed water sprinkler by mounting a 40-year-old tank, obtained from the city of Denver, on a 1929 renovated truck, and adding a platform-mounted pump and motor in the rear.

2-Ton Roller Converted to Portable 6-Ton

An old 2-ton tow-type roller was converted to an 6-ton unit with rubber-tired transit wheels. The two steel drums were removed and filled with concrete. Stout shear plates were welded around the roller frame supports, to reinforce for heavier duty. Dual wheels from an old Liberty truck were then connected to either side of the frame, the cut-off axle tubes being welded to the roller frame in such a position that the wheels are off the ground during roller operation, but carry the roller in the clear when the roller frame is flopped over with a truck chain and hitch. This rebuilt roller does a fine job, and incidentally is helping us get additional service out of some obsolete 9.75" x 24" tires.

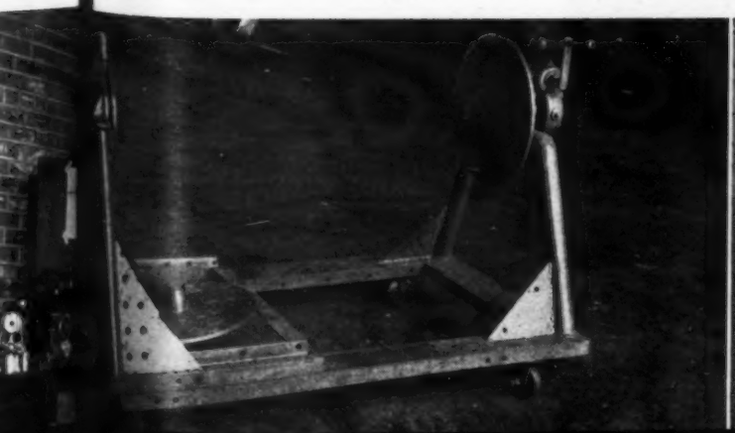
Portable Gas Tank from Junk

Our men are also proud of a 500-gal. gasoline storage trailer which cost the state practically nothing except for purchase of some second-hand or junk spindles, bearings, wheels and rims. The springs came from a Liberty truck, the frame from an old Adams No. 6 maintainer frame, the axle from a section of the dipper stick of a light shovel, and the telescoping pipe stands (front and rear) came from snow-plow wing push pipes. The tank is cradled on a



Piston honing equipment—part of Colorado's unusually complete motor overhauling facilities.

Motor stand manufactured in the Denver shop. Note discarded bearings used as castors. Other parts also from salvage or scrap.



The water tank that cost nothing but spare-time shop labor to assemble.

Shop foreman Roy Petersen with a snow truck that was "factory overhauled" during the summer, in line with Colorado's policy of thoroughness in preventive maintenance.

cushion consisting of old tire flaps. The tank had seen 10 years in other duty. The unit is balanced for easy one-man handling while empty.

This "spare time" tinkering has also resulted in a good many shop improvements. A heavy-duty motor stand, to mention one example, was made, using the worm gear off that same old Adams No. 6 grader, a hand crank, and circle plates from a Galion grader. This, too, has old bearings for castors.

Equipment maintenance is under the general direction of D. N. Stewart, state superintendent of maintenance. F. E. Cummings is state equipment inspector. Chas. D. Vail is state highway engineer of Colorado.

Credit for the design of the various shop-made appliances described goes to Equipment Inspector, Fred E. Cummings. Mr. Cummings has been particularly helpful in arranging the shop equipment, designing new attachments and assisting the mechanics in constructing them.

Cincinnati Puts Surplus and Marginal Equipment in Dead Storage

While strictly speaking the city has no such thing as "surplus" equipment today, each department does have certain units which are not out on duty at any given period, or are "second string" older machines useful in peak times. Last year, as a result of a survey, all such units were put under roof in dead storage, to minimize deterioration of tires and the units themselves. These machines are taken out to replace wrecked vehicles or otherwise as needed.

▼

Highway Defects Cause 6% of Accidents

State reports of fatal accidents in 1942 according to Accident Facts, a publication of the National Safety Community indicated that highway defects were responsible for 6 per cent of the accidents.

▼

M. G. Spangler Commissioned Lieutenant Commander

M. G. Spangler, research associate professor of civil engineering at Iowa State College, Ames, Iowa, has been commissioned Lieut.-Commander, Civil Engineering Corps, United States Naval Reserve.

Wayne County Repairs Surveying Instruments in Machine Shop

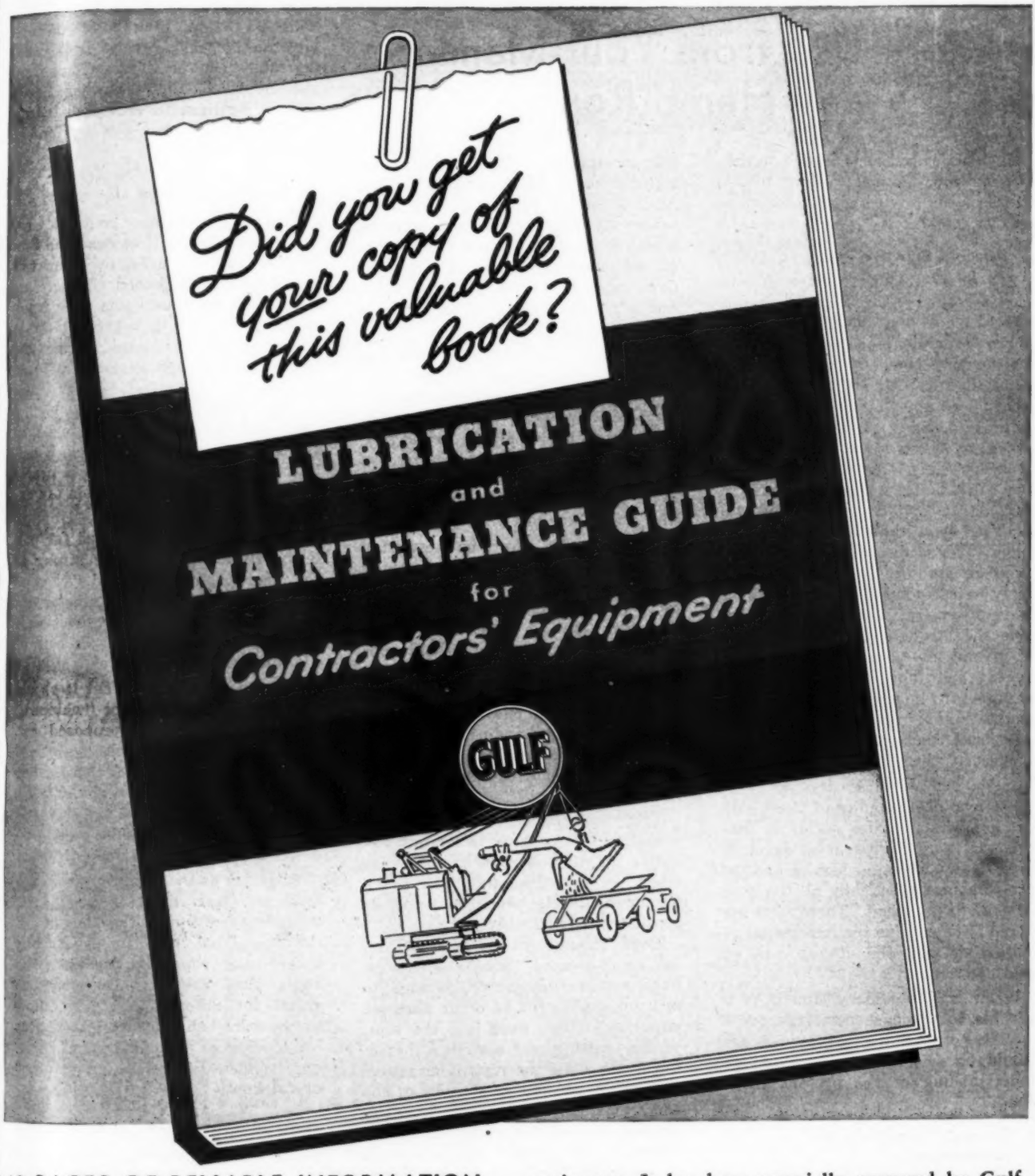
Wood framed glassed in cabinet for surveying instruments awaiting repair.

Transits and levels that Wayne County formerly sent to the factory for repairs were fixed skillfully last winter by a machinist in the county's headquarters shop. A dust proof glass lined instrument case was built to house the instruments while in the shop awaiting repair. Broken brass spindle shanks and other precision parts were successfully turned on a small lathe.

Replacement of cross hairs was the real problem. According to J. K. Norton of the county road department old barns in the Wayne County area were visited to get cobwebs for cross hairs. These were floated in water, and lifting them into place with tiny pick-up instruments was something of a feat.

▼

Army Licks Road Problems in Africa.—When the United States troops invaded North Africa they found roads worse than backwoods trails in America. The problem was licked by Army engineers who prefected new techniques and equipment that resulted in laying out passable roadways in North Africa at the rate of four miles an hour.



60 PAGES OF RELIABLE INFORMATION IN HANDY POCKET SIZE!

Just off the press, this Guide is chock-full of facts on how to properly lubricate and maintain your vital mechanized equipment. It has been especially prepared by Gulf Lubrication Service Engineers with the sincere hope that it will prove helpful to you and your organization. It is easy to read and authentic in every detail. To get your copy of this useful book, just fill in the attached coupon.

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More Use from Your Manila and Hemp Rope

The following timely advice on care of your rope is contained in the A. G. C.'s new 75-page equipment maintenance manual*:

1. Possible Substitutes

The fibers that have hitherto been used for the manufacture of manila rope are not now obtainable and the stocks of manila rope on hand are insufficient to meet the requirements. Hence it has been necessary to seek other fibers which may be used as substitutes. Several are being employed, either by themselves or in combinations, and among them may be mentioned sisalana which comes from East Africa and Haiti, and henequin sisal which is grown in Mexico and Cuba. Jute is also used for ropes of one inch and less in diameter with fairly satisfactory results. Ropes made of any of these fibers do not have the strength or the endurance of manila rope, although they are treated and lubricated during their manufacture in much the same manner as manila rope, but they should be utilized whenever possible in order to conserve the supply of manila rope for the armed services.

The available supplies of these substitute fibers are also decidedly limited, and the ever increasing demands of the Navy, Maritime service and the Army require practically all the rope that can be produced. These facts are stated to emphasize the importance of conserving with the utmost care all rope now on hand.

When it is necessary, and if it is possible to purchase new rope for a specific purpose, the size and grade should be selected with a thorough understanding of the present situation.

2. General Precautions and Maintenance

When putting a new rope into service, great care should be taken to prevent kinks. A regular right-laid rope should unwind from a coil in a counter-clock wise direction. Another important conservation measure is the proper storage of rope. It should be kept in a dry, unheated building or a room with a free circulation of air. It should never be left on the floor but should be placed in loose coils on a wooden grating or hung on wooden pegs on the wall. If a rope is badly soiled it should be thoroughly washed in clean water and completely dried before storing. Rope should never be stored in a small confined space without adequate circulation of air. Mildew and dry rot are apt to develop and untimely failure of the rope is practically certain.

Ropes in use are often subjected to continual twisting and turning in one direction. Under such circumstances, compensating turns must be thrown in or out to avoid damage to the rope structure. Kinks should never be pulled through restricted spaces, such as tackle blocks, as this will tend to shear the fibers and weaken the rope.

Rope should never be stored in proximity to chemicals, especially acids or alkalis. Not only will contact with the chemicals injure the rope, but often the fumes are destructive. Acids used in storage batteries and in washing down buildings frequently cause serious injury. Linseed and other drying oils are also damaging to rope, as is paint of all kinds. Rope should be kept out of reach of animals as animal excreta will cause loss of strength.

Every precaution should be taken to reduce service wear to a minimum. Never permit one rope to chafe another. Do not drag rope over sharp or rough objects which may cut or break the outside fibers.

Rope should not be dragged on the ground more than is necessary. Such action will cause the rope to pick up sand, grit, or other abrasive particles. These work into the rope, rapidly cutting and abrading the inner fibers while the rope is in action.

Never use blocks or sheaves of too small diameter for the rope. Continual bending of the rope over small sheaves adds greatly to the normal strain and frictional wear. Sharp bends reduce the tensile strength of rope by placing extra strain on the outer fibers. The most reliable rope manufacturers build into their products proper and sufficient lubrication to last during the lifetime of the rope. It is unnecessary and undesirable to attempt to add lubricant, as abrasive matter is sure to be carried into the inner fibers, causing serious injury.

To overload ropes is not only costly, but it is dangerous and may cause serious injury to workmen and to valuable materials. It is good practice to reverse ropes, end for end, periodically so that all sections of the rope may receive equal wear. It is often desirable to cut off short sections from the end of a rope in cases where heavy wear is localized. This will distribute the heavy duty over new sections of the rope.

3. Knots and Splices

The life of rope may be greatly extended by splicing it at dead end connections, around eyes, or when two ropes have to be joined. Splices are much stronger than knots for permanent connections. It is estimated that even the best knots reduce the strength of a rope approximately 50 per cent. A so-called "short" splice is the strongest method of joining ropes but it should not be used on ropes that have to run through pulleys as the size of the rope is nearly doubled and the outer strands are exposed to abnormal chafing.

The long splice is adapted for pulley work and is nearly as strong as the short splice. Special types of splices are required for transmission and towing service. A well-made splice has from 85 to 95 per cent of the rope's strength.

When a rope is to be cut it should first be securely bound or "whipped," on each side of the proposed cut. These bindings should be tight and secure and the ends of the binding twine should be securely fastened. The rope may then be cut between these bindings without danger of untwisting or raveling of the rope ends.

Inasmuch as the safety of the workmen, materials and the rope itself depends chiefly upon the strength of the rope hitch, it is important that those using ropes be familiar with knots that are best adapted and safest for different uses. Manufacturers will gladly furnish instructions for binding or whipping ropes, making splices, and for tieing safe and useful knots.

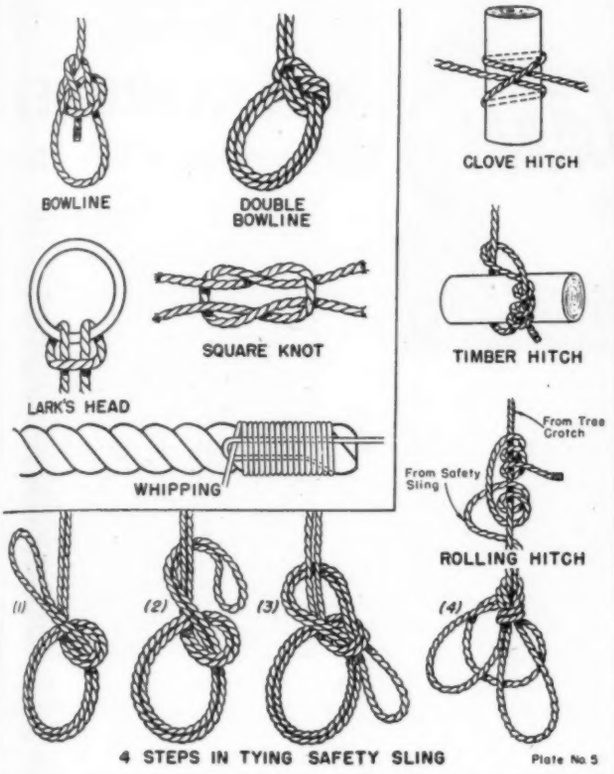
4. Safety Factor for Loads

The safety factor of a rope is the ratio between the minimum breaking strength and the load applied. It is of the utmost importance in the interest of safety and of the enduring life of the rope that a proper factor of safety be maintained at all times. A factor of 5 is recommended under ordinary circumstances. Due allowance for the condition of a rope should be made when determining the proper factor. Experience in judging the condition of used rope is necessary, but a careful workman will make it a point to err on the side of safety rather than to endanger the lives of his fellow workers.

*Price 50 cents. Available on request to the Associated General Contractors of America, Inc., Munsey Bldg., Washington, D. C.

Knots for Longer Rope Life

KNOTS



4 STEPS IN TYING SAFETY SLING Plate No. 5

From the Michigan State Highway Department manual, "Standard Procedure for Highway Maintenance"

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Meet Heavy Duty Needs of

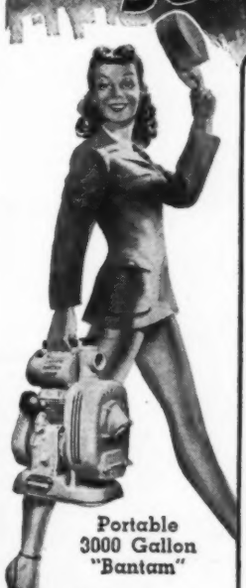
Logging Operations

ROLLER BEARING COMPANY of AMERICA

28 Whitehead Road Trenton, N. J.

the PUMPS that EXCEED their PROMISES

JAEGER "SURE-PRIME"

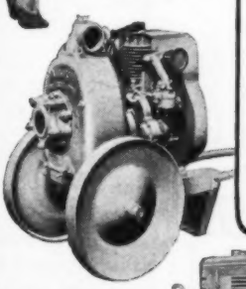


Portable 3000 Gallon "Bantam"

for Years the ONLY Pumps that have been Factory-Tested and Certified *and Regularly Exceed Their Guarantee*

- with up to 5 times faster, 100% automatic priming,
- with high air and water capacity under adverse conditions,
- with thousands of extra hours of trouble-free service.

ON SALVAGE WORK AT PEARL HARBOR (where Jaeger 10" Pumps of 40,000,000 gallons daily capacity worked constantly for 10 months) and thousands of other war jobs at home and abroad, Jaeger Pumps are "going places" for you and Uncle Sam. Your Jaeger dealer has them for sale or rent.



Above: 3" Heavy Duty Model

Right: 10" Portable Pump

All sizes 1½" to 10"—Gas, Electric, Diesel

Also Jetting Pumps

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Repair Parts and Quick Service in Over 100 Cities

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THE TIME IS NOW!

For speedy, wartime emergency repair welding, you can't beat MANGANAL WELDING PRODUCTS. With MANGANAL you can meet every requirement for efficient, fast, durable repair welding.

Repair your breaks and worn parts with Manganal—it's the easy, quick and efficient way. Manganal alloy steel welding, wedge bars and shapes give new lives to old parts.

MANGANAL

STULZ-SICKLES CO.
NEWARK, N.J.

Road Officials Meet with WPB

(*Continued from page* 64)

be separate or joint with representatives of the Construction Machinery Division and the Government Division of the WPB.

Similar meetings were previously held with representative committees of the nation's contractors and equipment distributors. The personnel of the three WPB advisory committees reviewing the progress of the equipment and machinery program are:

Government Group—George C. Stanley, City Engineer, Burlington, Vermont; J. C. Akers, Davidson County, Tennessee; W. H. Root, Maintenance Engineer, State Highway Department, Ames, Iowa; L. J. Cook, Director of Purchases, New York, New York; J. Sweeney, Director, Dept. of Public Works, Allegheny County, Pittsburgh, Pa.; D. C. Greer, State Highway Engineer, Austin, Texas; R. W. Gamble, Supt. of Streets, Milwaukee, Wis.; H. G. Sours, Director of State Highways, Columbus, Ohio; R. B. Traver, Supt. of Highways, Onondaga County, Syracuse, New York; Charles Grakelow, Director of Purchases, City of Philadelphia, Pa.; C. W. Brown, State Highway Engineer, Jefferson City, Mo.; H. A. McDonald, Commissioner, Dept. of Public Works, Boston, Mass.

Contractors—J. Rutledge Hill, Gifford Hill Construction Co., Dallas, Texas; Carl E. Nelson, Logan, Utah; Morris E. De Witt, Porter De Witt Construction Co., Kirkwood, Mo.; Ed. A. Daylor, E. A. Daylor Co., Coatesville, Pa.; D. W. Wenklemen, Syracuse, N. Y.; F. W. Parrott, C. F. Lytle Co., Sioux City, Iowa; Joseph R. Perini, B. Perini & Sons, Inc., Framingham, Mass.; C. W. Smith, Smith Engineering & Construction Co., Pensacola, Fla.

Dealers' Group—Lewis W. Elphinstone, D. C. Elphinstone, Inc., Baltimore, Md.; L. W. Gardner, Howard Cooper Corp., Portland, Ore.; M. Hunter, Hunter Tractor & Machinery Co., Milwaukee, Wis.; James L. Nellis, Choctaw Culvert and Machinery Co., Memphis, Tennessee; E. R. Bacon, E. R. Bacon Co., San Francisco, Calif.; Goodlow Yancey, Yancey Bros. Co., Atlanta, Ga.; H. O. Penn, H. O. Penn Machinery Co., New York, N. Y.; Ed Phillips, Phillips Machinery Co., Richmond, Va.; Chas. Wehner, Miss. Valley Equipment Co., St. Louis, Mo.; J. S. Gilman, Wm. H. Ziegler Co., Minneapolis, Minn.; C. G. Hewitt, L. B. Smith, Inc., Camp Hill, Pa.

H. Hershey Miller Joins Staff of Calcium Chloride Assn.

H. Hershey Miller has been engaged as an engineer representative of the Calcium Chloride Association, with assignment especially as counsellor on concreting.

H. H. Miller

For many years he was Chief Materials Engineer for the Pennsylvania Department of Highways and later Testing Engineer for the Pennsylvania Turnpike Commission. For the past three years he has been resident engineer of the Pennsylvania Sand and Gravel Producers' Association.

After graduation from Pennsylvania State College, Mr. Miller entered the Army and served in the 103rd Engineers and the 109th Infantry and was a captain on the Staff of General Pershing in France when World War I ended.

He is author of a number of articles on concrete problems and has served on committees of the Highway Research Board, American Society for Testing Materials and Pennsylvania Society of Professional Engineers and, at present, is president of the Engineers Society of Pennsylvania.

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HEADQUARTERS FOR REPAIRS— —any make—

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalogue RS 8-9 of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

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Bottle-tight but dead-easy to open, WGB Clarofiers keep oil amber clear with the minimum of cost and trouble. They're strong, simple, and permanent. No tools are needed to refill. They save wear and replacement of parts.

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This free book describes low-cost oil clarifying for all vehicles, explains its principles and operation, lists the many engines on which WGB is standard. Free on request. Write today.

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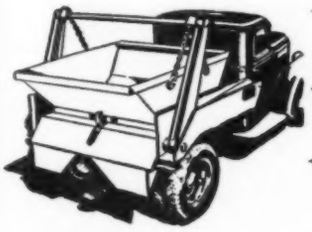

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← 15 Seconds to load or dump

← Saves time, manpower and maintenance

Use 5 to 10 dump buckets with each Load Lugger for economical results.

One truck does the work of several when you mount a Load Lugger on the chassis. Buckets are picked up as fast as filled, then hauled, dumped and returned. No waiting for trucks to be loaded. A handy material handling unit with a hundred-and-one uses . . . road repair, refuse disposal, snow removal, sewage work, street improvements and construction jobs. Write for Catalog No. 44.

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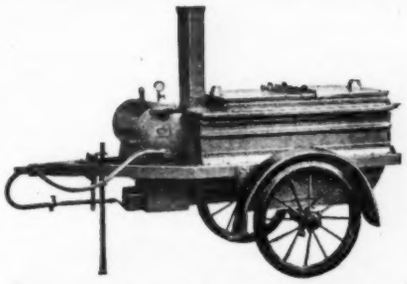
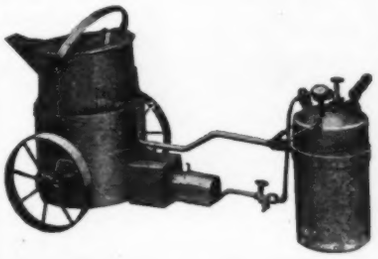
CONNERY'S HEATING KETTLE

For speedy heating of tar and asphalt—



Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.



Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

CONNERY CONSTRUCTION Co.
3900 North Second St. Philadelphia, Pa.

"WATER BOY"

TIME to design Ben-Hur Trailers to fit your needs, too, is YOURS to use now. Particularly for your post-war plans —involving material transport or special units.

We can help you to profitable solutions. Send for bulletin.

Awarded to Ben-Hur for Outstanding War Production.

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634 EAST KEEFE AVENUE
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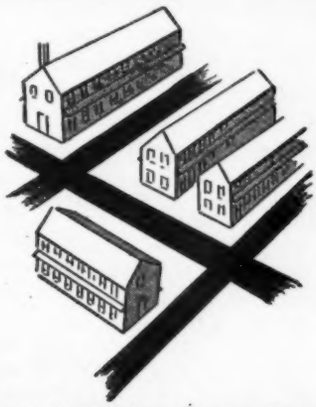
INDUSTRIAL TRAILERS

ASPHALT for CANTONMENT STREETS



Various low-cost types of Asphalt construction are ideally suited for cantonment streets where an improved all-weather surface is needed. Asphalt can be easily maintained for as long as it is needed, and can be abandoned at any time without a great investment loss.

Wherever Standard Oil Asphalt products are sold, there is an Asphalt Representative who can give you full information about these and other uses of Asphalt. Write

STANDARD OIL COMPANY (Indiana)
910 SOUTH MICHIGAN AVENUE, CHICAGO

New Equipment and Materials

New Tiltdozer

Designed so its blade may be tilted a minimum of 12 inches on either side, or dropped parallel for straight Bulldozing, the A4 Tiltdozer is being

Model A Tiltdozer

introduced by R. G. LeTourneau, Inc., Peoria, Ill.

The Tiltdozer blade tilt is adjusted through a very simple worm-gear-driven mechanism, manually operated by a crank, and equipped with a hand-set pin to hold the blade stationary. This newest LeTourneau Dozer was designed especially for the Army Combat Engineers but holds equal promise for construction, logging, mining, etc. It is particularly adapted to digging "V" ditches, making initial cuts and passes, and dislodging stumps and other obstacles.

The LeTourneau A4 Tiltdozer operates with either R4 or D4 "Caterpillar" tractor, and the LeTourneau Model T or Model HN Power Control Units.

▼

New Tractor Sweeper

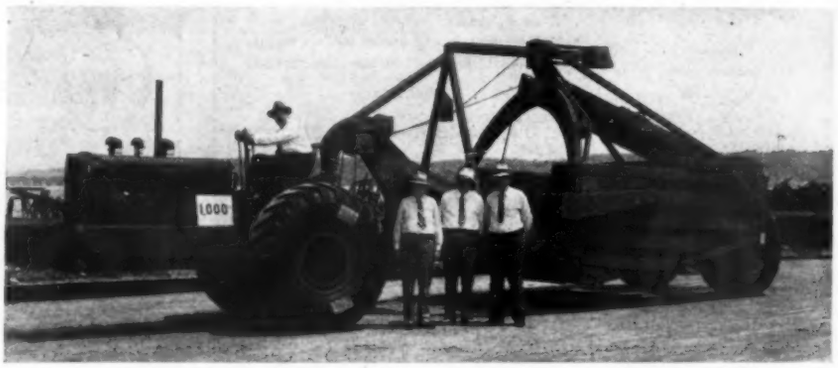
A sweeper adaptable to the front end of almost all makes of wheel tractors and some trucks has been put on the market by the W. E. Grace Manufacturing Company of Dallas, Texas. Features are instant adjustment to sweep either right or left, hydraulic brush lift, and a minimum of moving parts. The brush width is 75 in. with a sweeping path of 55 in. As the rear or side power take-off of the tractor is not tied up, other tractor attachments such as mowers are not interfered with and may be left on the tractor.

New Tractor Sweeper

▼

1000th Tournapull Goes to War

The illustration shows the 1000th Tournapull which rolled off the R. G. LeTourneau assembly line recently and is now at an "undisclosed destination" in the service of the War Department. Attached to the "1,000th" is a LeTourneau LP Carryall Scraper, which has a capacity of 15 cubic yards heaped.



1000th Model C Tournapull. On the seat is Mr. R. G. LeTourneau. Left to right: Mr. Denn M. Burgess, general manager; Mr. E. R. Galvin, general sales manager, and Mr. Elmer E. Isgren, plant manager, all at the Peoria, Illinois, plant of R. G. LeTourneau, Inc.

▼

New Detergent Type Lubricating Oil

Development of a new detergent type lubricating oil which will reduce wear and assure engine cleanness and oil stability for low speed Diesel engines has been announced by Standard Oil Company of Indiana.

Many engines give clean operation with conventional oils, but where dirty operation cannot be corrected by mechanical adjustment, the new detergent type lubricating oil can be used, according to Standard Oil engineers.

The new oil will thus prevent ring-sticking, piston scuffing and excessive sludge and gum deposits.

The detergency results from the use of an additive which is both a detergent and an oxidation inhibitor.

Construction Pumps Help Complete the World's Biggest Marine Salvage Job

In announcing that the U.S.S. Lafayette now floats on an even keel at her berth in New York Harbor, the vital part contractor's pumps played in her "resurrection" was revealed.

Salvage operations, started shortly after the 79,000-ton ex-Normandie rolled on her side and settled into the harbor mud following the tragic fire on February 9, 1942, were climaxed by the delicate job of dewatering and refloating the huge hull. Removal of the 100,000 tons of water from the ship began early in August with the installation of a large battery of 3", 6", and 10" gas-engine-driven centrifugal pumps, mounted on hinged platforms in the above-water portion of the ship's interior. As the ship's list was corrected, the hinged platforms were hoisted to level positions.

Dewatering the huge hull was not merely a matter of pumping out the water; extremely careful distribution of weight and buoyancy had to be maintained to avert excessive strains on the hull as it broke loose from the mud. Divers with air jets broke the mud "seal" as the hull was righted.

A Carver Certified Centrifugal Pump helping dewater the U.S.S. Lafayette

CORONACH

"Of those immortal dead who live again
In minds made better by their presence."

HENRY C. MILLER, Division Engineer, Ohio State Highway Department for 15 years, died Aug. 20.

▼

GARRETT J. KANE, 44, chief engineer for the WPA in Ohio until recently, and former grade separation engineer in the State Highway Department, at Columbus, O., died Aug. 26.

▼

THOMAS EARLE, 77, widely known bridge engineer, died last month at Philadelphia.

A graduate of Rensselaer Polytechnic Institute, he participated in design and construction of the Delaware River Bridge between Philadelphia and Camden, N. J., and bridges over the East River at New York and over the Niagara River. He was president of Thomas Earle & Sons, Inc., Philadelphia.

▼

WALTER A. JONES, former chairman of the Pennsylvania Turnpike Commission, which constructed the $70,000,000 express toll highway across Pennsylvania, died today at his home in Washington, D. C. He was 68.

Mr. Jones died three days after his resignation as a member of the Turnpike Commission became effective. He was chairman of the commission from its creation in 1937 until a year ago when he resigned the chairmanship because of ill health, but retained membership on the commission.

▼

A. K. HAXSTUN, highway engineer, Public Roads Administration, died September 4, 1943.

Mr. Haxstun, a graduate of Yale University, served overseas in World War I, following which he was employed on location and heavy construction with the North Carolina State Highway and Public Works Commission, the Mexican National Highway Commission in Mexico, the American Road Builders Association, and since 1928, with the Public Roads Administration on the location of the Blue Ridge Parkway and more particularly in various Central and South American countries.

PAN AMERICAN PERFORMS *Black Magic*

Turns Jungles Into Airports Practically Overnight!

Building air bases on routes to the world's battlefronts, Pan American Airways has battled sand and mud, jungle and desert in South America . . . Africa . . . Asia . . . and on many of the islands in between!

In this company's vast experience, "seamless" bituminous runways have proven most adaptable because they are swiftly constructed, ready for immediate use and capable of handling all types of aircraft from speedy pursuit planes to huge transports.

As you draw up post-war plans for airports, highways and streets in *your* community, benefit from the many advantages of bituminous construction. *Resilient* — easy on the passengers. *Non-glare* — for protection and comfort of driver or pilot. *Safety surface* — minimizes skidding, with less wear on tires. *Durable* — lasts for years under heavy traffic. *Low-cost* — more all-weather surfaces for less money. New booklet outlines road-building experiences during past ten years in U. S. A., describes reasons for strong trend toward "seamless" bituminous construction. Send for your *free* copy today!

ETNYRE
"Black Topper"
BITUMINOUS DISTRIBUTORS

E. D. ETNYRE & CO., MAIN PLANT AND OFFICE, OREGON, ILLINOIS, U. S. A.

With the Manufacturers

Thomas A. Hicks of Universal Atlas Retires

Thomas A. Hicks, general chemist of the Universal Atlas Cement Company, United States Steel Corporation subsidiary, retired from active service August 31, 1943.

Mr. Hicks graduated in chemistry from the Case School of Applied Science in 1896. He became chief chemist of the Art Portland Cement Company at Ransoms, near Sandusky, Ohio, in 1897 and of the Whitehall Portland Cement Company at Cementon, Pa., in 1900. He began with the Atlas Portland Cement Company as chief chemist at its Northampton, Pa., plant in 1904 and became chief chemist for the Atlas company in 1916 and for the Universal Atlas company in 1930.

Mr. Hicks was in charge of the original investigations on the development of Atlas White and Atlas Lumnite cements, and closely associated with the original manufacture of Unaflo oil-well cement, Atlas High-Early Strength cement, and the various types of modified cements.

▼

Need for Air-Borne Tractor Shovels Makes Plant Increase a Necessity

Hough air-borne tractor shovels are proving so valuable to the war effort on beaches and fighting fronts that in order to meet increased government orders, it has been necessary to triple the size of the buildings and production facilities of the Frank C. Hough Co.'s No. 1 plant at Libertyville, Illinois. The air-borne shovel is small, rugged and compact, and can be easily stowed away on a transport plane from which it emerges all ready to get to work.

▼

Army-Navy "E" Award to Baker Manufacturing Co.

The Baker Manufacturing Co. of Springfield, Ill., has been awarded the Army-Navy "E".

W. C. Staley, president of the Baker company, received the award and the Army-Navy "E" burgee from Col.

Governor Dwight H. Green of Illinois making Army-Navy "E" Dedication Address at Baker Mfg. Co., Springfield, Ill.

W. H. Hastings U. S. A., Chief of Production, Branch Office of Division Engineer, Great Lakes, Illinois, who delivered the principal address. Lt. Comm. H. B. Freeman, U. S. N. R., Resident Inspector of Naval Material, St. Louis, Mo. presented the employees' "E" pins, which were accepted for the workers by Henry L. Hayes, president, C. I. O. Local No. 2207, United Steel Workers. Miss Frances A. Corsiatto and John W. Kopatz received the token pins on the speakers' platform.

J. Emil Smith, publisher of the Illinois State Journal and Register, was master of ceremonies. Springfield Post No. 32, American Legion, provided the color guard; and the Springfield Municipal Band played the national anthem and a program of patriotic airs.

The Baker Manufacturing Company is widely known as a maker of bulldozers and other earth-moving, snow removal and road maintenance equipment.

▼

Keystone Adds to Sales Staff

Jim Poole

James (Jim) Poole has recently been appointed to the sales staff of Keystone Asphalt Products Co., it was announced by T. R. Johnson, the company's Sales Manager.

Mr. Poole will assist Mr. Johnson in national sales work and will make his headquarters in the company's Chicago office.

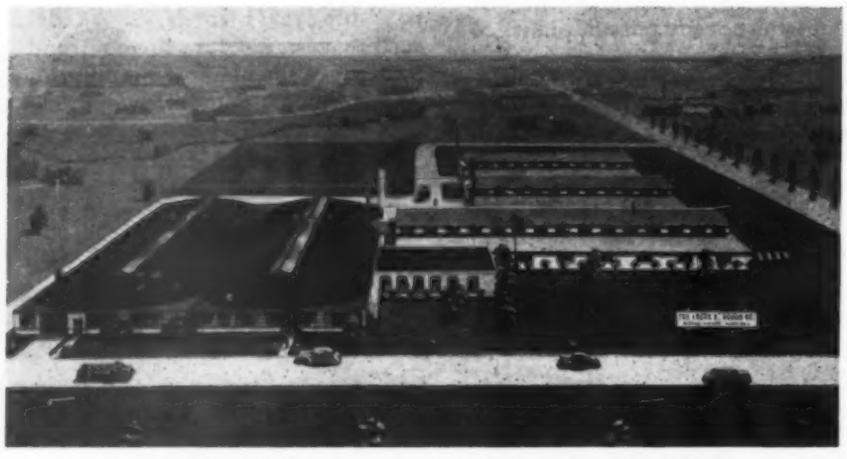
▼

Toluene Plant of Standard Oil of Indiana Completed

Standard Oil Company of Indiana's new toluene plant at its Whiting, Indiana, refinery is now completed and will shortly be shipping more toluene for manufacture into TNT for bombs for America's war planes than all sources in the United States produced in World War I, the company revealed in a "Progress Report" mailed with dividend checks to 96,000 stockholders.

Standard of Indiana will also rank as one of the leading producers of 100-octane aviation gasoline with the construction of other new units, most of which will be completed by the end of this year, the report states. These include new alkylation, isomerization, and catalytic cracking units and new fractionating towers.

To help solve the lack of facilities for transporting crude oil from new fields, which, according to the report, is one of the causes of gasoline rationing, Standard's subsidiary, Stanolind Pipe Line Company, this fall will start construction of a new 16-inch pipe line from the Slaughter pool of West Texas to Drumright, Oklahoma, with completion planned for April 1, 1944. Standard's net crude reserves as of July 1 this year were approximately 33,000,000 barrels greater than at the first of the year.



The Frank G. Hough Co.'s enlarged plant No. 1 at Libertyville, Ill.

Fetzer of Mack Gets OPA Post

Appointment of Albert C. Fetzer, vice president of Mack Manufacturing Corp., as a member of the OPA truck manufacturers advisory committee has been announced by the office of Prentiss M. Brown.

▼

RBC Acquires Additional Plant Space

To overcome increasingly crowded conditions in the Roller Bearing Company of America plant, 26,000 sq. ft. of additional space has been acquired in another location to be known as Plant No. 2. Movement of all assembly, servicing, packing and shipping facilities has been completed. Adequate warehouse space has also been provided for a complete stock of component parts and complete bearings. This change has enabled the Roller Bearing Company of America, Trenton, N. J., to revise the layout of Plant No. 1 by greatly expanding their manufacturing facilities, improve the conditions under which the bearings are produced and to help improve delivery schedules.

▼

Austin-Western Wins Army-Navy "E" Award

For a conspicuous job in turning out various products, some of which had never been built before; for making parts so accurate that they interchanged with units in the field and those made by other companies; and for using old equipment (some discarded by other users and dating back to World War I days) and making them work even better than before, saving Uncle Sam the expense of buying new machines, the Austin-Western Road Machinery Co.'s organization of Aurora, Ill., was awarded the coveted "E" pennant and each employee, an "E" pin.

Army-Navy "E" Pennant awarded Austin-Western. Pictured with the banner (reading left to right) are Lieut. Reginald Rader, U.S.N.; Jack Kreitz, shop committee chairman; McClure Kelley, President of the company, and Lieut. Col. G. V. Rountree, Chief of Contract Service for the Chicago ordnance district of the Army.

Among the products produced for the war effort are such items as caissons, ammunition wagons, tank parts, motorized sweepers for airbases, graders and rollers for road construction and maintenance, shovels and cranes, dump and trail cars for handling ore and stone, crushing and screening equipment and 155 M.M. howitzer carriages. The latter, a heavy piece of artillery credited with a major role in the conquest of Tunisia, is pictured with barrel in position on the following page. The unit weighs approximately 4½ tons; can be drawn by a truck at 50 m.p.h., and can fire a 95-lb. shell at a range exceeding 12,000 yards.

In awarding the pennant and speaking to a huge assemblage of em-

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For All *Approved* Road Jobs

☆ Here are the facts as to the availability of BITUVIA Road Tar for road patching and surface treatment jobs this year.

BITUVIA is available for use on any such project that has been approved as necessary to the war effort.

In making out your application for permits, you have the privilege of specifying the material you want to use. By specifying BITUVIA you are assured of a resilient, skid-resistant surface which is quickly applied and binds firmly. REILLY engineers will be glad to assist you in preparing your application.

Write or wire for further information. Pocket-size BITUVIA manual will be sent on request.

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STANDARD GRADES TO MEET ALL SPECIFICATIONS

REILLY TAR & CHEMICAL CORPORATION

Executive Offices: Merchants Bank Building, Indianapolis, Indiana

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SEVENTEEN · PLANTS · TO · SERVE · YOU

The Complete 155 Milimeter Howitzer

ployees, guests and company officials, from a decorated platform banked with flowers, Lt. Col. G. V. Rountree declared: "Austin-Western has met all delivery schedules with no rejections to date." Continuing he pointed out that at the Aberdeen proving ground when the first carriages came through and were disassembled, the workmanship was so exceptional that from that date such close scrutiny was no longer necessary. Then he added : "The Army appreciates this work and will use it to the best advantage." Remarks were also made by Lt. Reginald Rader, U.S.N., in presenting token pins to representative employees and those with long service records.

▼

F. B. Schwartz to Represent H. K. Porter

Mr. F. B. Schwartz, manager of Minnesota Pneumatic & Electric Tool Co., Minneapolis, Minn., has been named special representative for the Northwest for the complete line of products of H. K. Porter Company, Inc., Pittsburgh, Pa., comprising industrial locomotives, chemical processing equipment, and all types of pumps.

A native of Shakopee, Minn., Mr. Schwartz attended University of Minnesota. From 1926 to 1935 he worked for Chicago Pneumatic Tool Co., becoming Chicago assistant manager. Since then he has operated Minnesota Pneumatic & Electric Tool Co., which since July occupies a new shop and office building at 2231 Riverside Ave., Minneapolis, Minn.

▼

Caterpillar to Increase Production of Diesel Tractors

Substantially increased production of "Caterpillar" Diesel Tractors for military purposes will be achieved in the near future, it is revealed by Louis B. Neumiller, President of Caterpillar Tractor Co.

Some of the work will be done in the Victory Ordnance Plant at Decatur, Illinois, operated by the "Caterpillar" subsidiary, Caterpillar Military Engine Company, and much of the manufacturing and the final assembly will be handled in the Berwick, Pennsylvania, plant of the American Car and Foundry Co.

Certain important parts of the additional tractor production will be manufactured in the Peoria and San Leandro, California, "Caterpillar" plants. To permit this increased production in the Peoria plant which is already working to capacity, this plant will be relieved of requirements to produce certain other items of war material that are now being manufactured.

C. O. Wold, vice president of "Caterpillar" will be in charge of the entire program. Charles Woodley, Factory Manager of the tractor plant, has been detached from that service to become co-ordinator of the tractor production activities at Decatur and Berwick. During Mr. Woodley's assignment to this work, Assistant Factory Manager William Naumann will be Acting Factory Manager.

1 Gasoline or Diesel Power

2 Compressor Efficiency

3 Long Life!

4 Economical Engine Speed

5 Self Starting

6 Force-Feed Lubrication

7 Automatic Controls

8 Compact Dimensions

9 Light Weight

GETTING DOWN TO FINE POINTS

Hard hitting, "SKEETER-FAST" performance counts most in today's wartime operations. SCHRAMM compressors are doing their bit in this effort. They are light in weight, meaning that the extra weight that is ordinarily used goes into vital war equipment. Schramms are noted for long life and economical operation, a key essential during this period of material shortages. In other words, SCHRAMM has the fine points that count in getting work out.

SCHRAMM Inc.
THE COMPRESSOR PEOPLE
WEST CHESTER, PA.

H. K. Porter Co. Purchases Quimby Pump Co.

Purchase of Quimby Pump Co., with plants at Newark and New Brunswick, N. J., by H. K. Porter Co., Inc., Pittsburgh, Pa., has been announced by T. M. Evans, president of the Pittsburgh firm.

T. M. Evans

Established before the turn of the Century, Quimby Pump Co. manufactures a full line of pumps, including screw, centrifugal and rotex types used in industry. At present the company is also building considerable quantities of pumps for both the Navy and Maritime Commission. The Quimby plants will be operated as a division of H. K. Porter Co., Inc., a manufacturer of industrial locomotives and chemical processing equipment. The purchase was made in order to further diversify H. K. Porter Co., Inc.,'s line of products.

▼

Cletrac Receives Army-Navy "E" Award

For excellence in production and outstanding production achievement, the personnel of The Cleveland Tractor Company, of Cleveland, Ohio, was awarded the Army-Navy "E" at a colorful and impressive ceremony.

The award was conferred in recognition of the company's noteworthy contribution to the war effort, not only in the development and production of specialized crawler tractors built for the Air Corps, but for outstanding production of its standard product as well as the parts for tanks, Bofor anti-aircraft gun, and half-trac cars.

The special high-speed crawler tractor, designed and produced for the Air Corps, has seen service all over the world where United Nations are free to fight. These units are used on military air bases for towing and servicing all types of aircraft.

Army-Navy "E" pennant awarded Cleveland Tractor Co.

It is interesting to note that The Cleveland Tractor Company as far back as 1922 had perfected a high-speed military crawler vehicle, and have worked on similar vehicles since that time. Long before Pearl Harbor the Cletrac plant was in production of high-speed tractors, and after Pearl Harbor the company went out 100% for war work.

The presentation of the "E" award was made by Lt.-Col. T. H. Eichoff and received by Mr. L. H. Grutsch, Works Manager, and Mr. V. O'Neal, representing the employees.

The "E" pins were presented by Lt. Commander J. P. Sturgis of the U. S. Naval Reserves, assisted by Sgt. Arthur E. Sizer, U. S. Army, a veteran of the African campaign, now on sick leave.

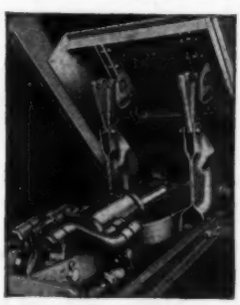
The "E" pins were accepted by a group of five of the oldest employees of The Cleveland Tractor Company, three of them representing labor and the other two representing the office employees. The Hon. Frank J.

A HERCULES HYDRAULIC BOOSTER HOIST

MAKES ANY TRUCK A... DUMP TRUCK

Install HERCULES DOUBLE-ARM HYDRAULIC HOISTS under your platform, stake, express or special bodies, which are now idle. Unload the easy way!

With wartime restrictions preventing your purchase of all the new equipment you need, it's more important than ever that present equipment be used at maximum efficiency.

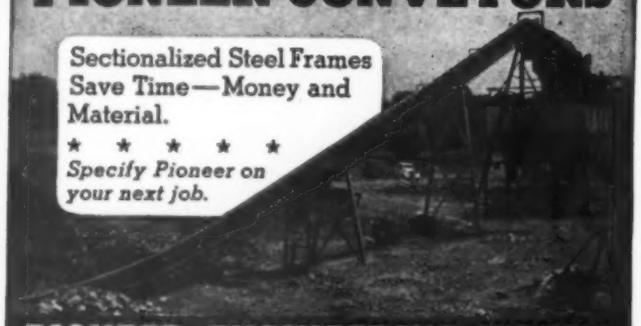


Model KXE Hercules Booster Hoist, with 6" cylinder, for bodies up to 12 feet long. Rated capacity of 4 tons with a 9 foot body. Control valve is operated from the driver's seat, and the low oil pressure required assures long life of unit.

Reinforcing plate relieves lifting strains. Assembly includes 12 foot steel sills for reinforcement of wood body sills.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

PIONEER CONVEYORS



Sectionalized Steel Frames Save Time—Money and Material.

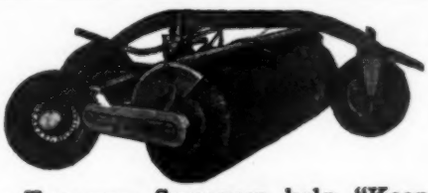
★ ★ ★ ★ ★

Specify Pioneer on your next job.

PIONEER ENGINEERING WORKS

1515 CENTRAL AVE. MINNEAPOLIS, MINNESOTA

Manufacturers of Quarry, Gravel Pit and Mining Machinery



Grace Two-way Sweepers help "Keep 'em Flying" by cleaning and maintaining airfield runways. The limitation orders restrict delivery of new machines. We offer prompt parts shipment to enable you to keep your present Grace Sweeper in A1 shape.

W. E. GRACE MFG. CO.

DALLAS, TEXAS

SILVER KING

HIGHWAY MOWER

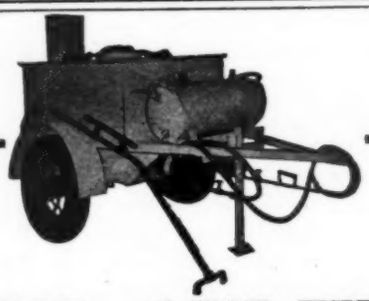
● Watch out for those minor damages that might put your highway mower out of action for the duration. A little extra care prevents extra wear and repair!

If you own a Silver King, you'll see, more than ever, what it means to have a mowing unit ENGINEERED for the job. If you want replacement parts now to insure tip-top "good-as-new" performance *tomorrow*, write. We will be glad to serve you.

MANUFACTURED BY

THE FATE-ROOT-HEATH CO.

PLYMOUTH, OHIO



ASPHALT and TAR KETTLES

FIRE PROOF—OIL BURNING

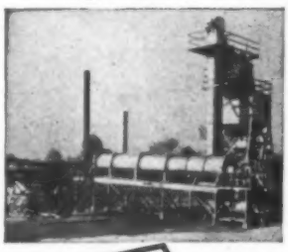
Hand and Motor driven spray.

Many sizes. Write for catalog.

Elkhart **White Mfg. Co.** Indiana

Asphalt Mixing Plants

STATIONARY and PORTABLE



★ Hetherington & Berner asphalt mixing plants, products of the pioneer builder of asphalt machinery in America, incorporate the latest features of design which have been proved in performance. Specifications conform to the most rigid state and city requirements, both as to engineering design and safety regulations. *Write for Bulletin RS-260.*

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Indianapolis, Indiana

America's First Builders of Asphalt Paving Machinery

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Life is thrilling in the Ozarks! Year 'round outdoor activities: golf, tennis, fishing, boating, hiking and riding! Exciting thoroughbred horse-racing at the Oaklawn Track from February 26 to March 30! Truly the most glorious resort spot in America! Stop at the Majestic Hotel in Hot Springs. Pleasant accommodations, ranging from single rooms with or without bath, to delightful 2, 3 and 4-room apartments. Government supervised bathhouse in connection with the hotel. Delightful Majestic Lodge on beautiful Lake Hamilton.

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FRANK W. BYRNES, Manager

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APARTMENTS AND BATHS

Direction—
Southwest Hotels Inc. Mrs. H. Grady Manning, Chairman—R. E. McEachin, Gen'l. Mgr.

"NORTH—EAST—SOUTH—WEST"

All around the earth are "FLEX-PLANE" contraction joint installers and finishing machines. Roads built by them are "good roads".

FLEXIBLE ROAD JOINT MACHINE CO.

WARREN, OHIO, U. S. A.

The Pioneer Does It Again

—Full Hydraulic Control—

The Root Model No. 55 Truck Patrol is a machine of many uses. Grading — Ditching — Shoulder Work — Cutting Sod — and Shaving Snow and Ice are but a few of its many valuable uses.

Working Today for Victory— Tomorrow for You.

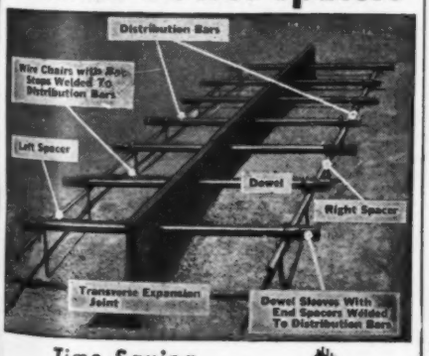
ROOT SPRING SCRAPER CO.
KALAMAZOO, MICHIGAN
Since 1891

Build Better Runways

for the Birds of War!

Insure Substantial, Long-Lasting Concrete Runways and Aprons with

LACLEDE Welded Dowel Spacers


Distribution Bars
Wire Chairs with Bolt Steps Welded To Distribution Bars
Left Spacer
Dowel
Right Spacer
Transverse Expansion Joint
Dowel Sleeves With End Spacers Welded To Distribution Bars

Time-Saving Accurate — Rigid Available Now!

LACLEDE

LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

General View of Ceremony

Lausche, Mayor of the City of Cleveland, was the Chairman and introduced the speakers.

▼

J. G. Walker Appointed Mgr. New York Sales District for Transite Pipe

James G. Walker, prominent in the civil and structural engineering field, has been appointed manager of the transite asbestos pipe department for the New York sales district of Johns - Manville. Mr. Walker assumed his new duties on June 16. A native of Lowell, Mass., his technical training includes two years at Holy Cross University and four years at the Massachusetts Institute of Technology, where he specialized in architectural engineering. After graduation from Technology, he served as engineer for several large construction companies, and for the Portland Cement Association.

J. G. Walker

In 1928 he was employed by the Alpha Portland Cement Company, where he served in an engineering sales capacity until joining Johns-Manville. Among the many organizations with which Mr. Walker is affiliated are the Engineers Club of New York, the Technology Club of New York, the American Society of Military Engineers, and the "Moles." Mr. Walker is 41 years old, married, has two children, and now lives in Scarsdale, N. Y.

▼

Frederick Baker Appointed Assistant Treasurer

Pittsburgh, Pa., Sept.—Blaw-Knox Company announces the addition to its executive staff of Mr. Frederick Baker, who has been appointed assistant treasurer.

Mr. Baker has been located in New York City for many years, where he has served as a director and financial executive for numerous industrial

Dig, Haul, Dump

in one operation

On jobs where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials without the help of other equipment.

First cost of a SAUERMAN machine is reasonable, maintenance expense is small, and the simplicity of operation permits easy one-man control of even the largest installation.

This equipment is very flexible and is readily adapted to meet new and difficult working conditions. Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will move as much as 1,000 tons per hour of the toughest materials.

Write for our catalog and see for yourself how others have cut costs on hundreds of dig-and-haul jobs with SAUERMAN Machines.

SAUERMAN BROS., Inc.
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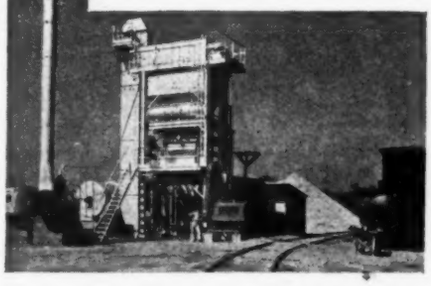
PORTABLE ASPHALT PLANTS
High Production—Low Cost



THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

BAD GOING? *Here's the Truck that eats it up!*

If you need a truck for grading, hauling under the worst conditions, snow-removal or similar services you'll find nothing, anywhere, to equal a Marmon-Herrington *All-Wheel-Drive* converted Ford. Prices are surprisingly low, and operating costs a revelation in dollar-savings. Write for literature.

MARMON-HERRINGTON CO., Inc.
INDIANAPOLIS, INDIANA, U. S. A.

Clearing House

FOR SALE

1¼ yd. Bucyrus 41B Shovel Attachment.
27-E Ransome Dual Drum Paver.
2 Ton C.H. & E. Tandem Roller.
3—15,000 gal. Steel Storage Tanks.
2 Ton Asphalt Plant.
750 and 1,000 gal. Etnyre Distributors.
3—Vulcan Nos. 1 and 2 Hammers.
1 yd. Koehring Gas Cat. Crane.
110 Ton Blaw-Knox Batch Bin.
½ yd. Blaw Knox Clam Shell.
20 Ton Ohio Locomotive Crane.
1 yd. B-2 Steam Shovels.
15 Ton 100 ft. Boom Clyde Steel Derrick with 100 H.P. Elec. Hoist.
15 Ton Plymouth Gas Locomotive.
2—3W & 5W Monighan Draglines.
9B3 & 7 McKiernan Terry Hammers.

TIDEWATER EQUIPMENT & MACHINERY CORP.
305 Madison Ave., New York City, N. Y.

EXCEPTIONAL BARGAINS
IMMEDIATE SHIPMENT

FOR SALE:
44C Barber-Greene Ditcher.
10S Koehring Mixer on 2 Pneumatic Tires.
4" Rex Self Priming Pump—Gasoline Power.

FOR RENT:
522 Barber-Greene Pneumatic Tired Bucket Loader—Gasoline Power.

PAUL L. MATCHETTE COMPANY
Exclusive Distributors for Barber-Greene Co.
Missouri — Kansas — Oklahoma
20 West 9th Street, Kansas City, Mo.

TRENCHING MACHINES

P & H Model 16-30
Digs 36" wide and 13' deep.
Excellent Condition.
Also, Like New 21 Parsons.

THE CHAS. M. INGERSOLL CO.
10930 Detroit Road — Rocky River, Ohio

TIRE REPAIRS

In all sizes of tractor, truck, wheelbarrow, passenger, or 1800x24 tires.
An EQUA-FLEX "Sectional" repair constructed in your tire is guaranteed. Best results and prompt service!
We have pre-war quality used passenger, truck and some farm tractor tires.

WALLACE TIRE SERVICE, Inc.
2320 S. Michigan Ave. — Chicago, Ill.

FOR SALE

1 NEW ENGLAND BUCKET LOADER.

DOOLEY BROS., INC.
39 George St.
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Construction Equipment For Sale

1—1941 Chevrolet Dump Body Truck
1—1941 Ford 95 Dump Body Truck
2—1939 Ford 85 Dump Body Truck
1—1931 Model A Dump Body Truck
1—2 C.Y. Heil Dump Body, practically new
1—Adams 303 Tandem Motor Grader
1—Adams 412 Tandem Motor Grader

All in good condition including rubber, prices right.

Apply,

A. J. HANSON
Tunica, Miss.

FOR SALE

1—2-ton Asphalt Plant complt.—boiler, dryer, storage tanks, etc.; has 2½ ton cap. mixer.

Box 10, Roads and Streets,
330 So. Wells St.
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FOR SALE

10 M Barnes Pump—2"—10,000 G.P.M. used very little. Bay City ¾ Swing Shovel No. 971 with ⅝ Bucket in good condition.

Riverside Landscape Co.
374 Lexington Ave.
New York City, N. Y.

FOR RENT OR SALE

No. 4 Northwest Crane and Shovel.
No. 101 Lima Crane, Shovel and Dragline.
Osgood Shovel and Crane.
Marion 1 yd. Shovel and Crane.
6 bag 27E Koehring Paver.

WALLER PAVING COMPANY, INC.
P.O. Box 46 — SALISBURY, MARYLAND
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FOR SALE

McLanahan 18x24 Rolls Crusher complete with 30-yd. bin, elecator, conveyor, belts, etc., with 18x24 secondary crusher; powered with practically new D-13000 "Caterpillar" Diesel unit. This outfit all in good condition and ready to work.

MARTIN TRACTOR COMPANY,
Chanute, Kansas

FOR SALE

1—1¼ yard Lima combination shovel dragline and crane, completely rebuilt.
2—Gardner-Denver 420 cu. ft. air compressors powered with caterpillar diesel engines mounted on trucks.
4—Gardner-Denver wagon drills.
1—Caterpillar Model 48 elevating grader powered with diesel engine.
1—Ingersoll-Rand jack bit grinder.

ANDERSON EQUIPMENT COMPANY
Merchants Nat. Bk. Bldg., Omaha 2, Nebr.

TRANSITS and LEVELS

New or Rebuilt
Sale or Rent

Headquarters for REPAIRS — any make. Factory Service. We will also *buy* your old instruments or take them in *trade*.

A complete line of Engineering Instruments and Equipment for Field or Office. Write for Bulletin RS 89.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 N. 12th St. — Philadelphia, Penna.

FOR SALE OR RENT

2—2 Ton C.H.&E. Tandem Gas Rollers.
1000 Gal. Cap. Distributor Truck.
4—15,000 Gal. Steel Storage Tanks.
12x20 Farrel Jaw Crusher.
3 KW and 5 KW Light Plants.
2 Ton Asphalt Plant.

L. M. STANHOPE
305 Conestoga Road — Wayne, Penna.

HELP WANTED

Salesman — Manufacturer of nationally advertised and nationally used Snow Plow Warning Light, interested in contacting salesmen carrying several non-competitive lines, calling on highway departments, townships, municipalities. Season about ready to start. Write Keystone Snow Plow Light Company, 1410 W. Hunting Park Ave., Philadelphia, Pa.

EQUIPMENT WANTED

Wanted to Buy—Portable Asphalt Plant of 350 to 500 tons capacity. Apply to Phil H. McGuire, Box 34, 35th Street Station, Norfolk, Va.

POSITION WANTED

Position Wanted with good going concern. Have 30 yrs. experience as supt. and foreman on all classes of grading, excavating on both highway and city work; sewers, airports, levees; familiar with all modern equipment and can handle labor. 55 yrs. old, in good health, will go anywhere but prefer the South. Dependable and sober. Now employed. Best of references. Box 15, Roads and Streets, 330 So. Wells St., Chicago, Ill.

BUY WAR BONDS

enterprises. He is a Yale engineering graduate and a member of the Yale Club of New York.

▼

Major Winners in Baker $5,000.00 Post-War Products Contest Named

W. Converse Staley, president of The Baker Manufacturing Company, Springfield, Illinois, has just announced the first nine winners in the company's $5,000.00 Post-War Products Contest which closed last month. The competition was for suggestions on new equipments to be made by Baker after the war, and drew ideas from Baker representatives in all parts of the United States and Canada.

S. E. Gaines

"Our company felt that American industry should be looking toward the future when we shall have peace with victory," said Mr. Staley. "If a change in our peace-time production is indicated, we wanted the men who sell and service Baker products to have a hand in shaping that post-war trend. The contest has been highly successful."

Winner of the capital prize of $1,000.00 was S. E. Gaines, 2328 Alturas Drive, Bakersfield, Calif., with the Ace Tractor Company of that city.

Second prize — $750.00 — went to P. B. Beebe, 3827 Edwards Road, Norwood, Ohio, associated with the Construction Equipment Company of Cincinnati, Ohio. Third prize—$500.00 —went to Arthur R. Hill, East Brookfield, Vt., with the Casellini-Venable Corp., Barre, Vt. The fourth prize—$250.00—was won by E. M. Yaw, 3118 Ramin Avenue, Houston, Texas, associated with the Benson Tractor Co. of that city.

Five prizes of $100.00 each were awarded to Herbert L. Moore, 758 Webster Street, Needham, Mass. (Clark-Wilcox Company, Boston); Eugene Swenson, 260 Marrett Road, Lexington, Mass. (Dyar Sales & Machinery Co., Cambridge, Mass.); H. G. Walling, 1033 S. E. Main, Portland, Oregon (Walling Tractor & Equipment Company); E. M. Ober, 1757 First Avenue So., Seattle, Wash. (A. H. Cox & Company, Seattle); and Glenn Paschal, 2349 South Seventh Street, Springfield, Illinois (Illinois Road Equipment Co., Springfield).

The remaining $2,500.00 of the prize money is to be divided in twenty prizes of $50.00 and thirty prizes of $25.00 among the next sixty ranking contestants. The board of judges composed of L. W. Wallace, Vice-President, Trundle Engineering Co., Cleveland, Ohio, V. M. Dobeus, Chief Engineer, Allis-Chambers Mfg. Co., Springfield, Ill., and H. H. Washbond, Chief Engineer, The Baker Manufacturing Company, Springfield, Ill., are now engaged in making these selections.

"Naturally we cannot disclose the nature of the suggestions which won the larger awards," explained Mr. Staley. "Suffice it to say that we are delighted to discover such ingenuity, engineering skill and forethought in our sales and service organization."

▼

Appointments by Universal Atlas

The following appointments effective Sept. 1 have been announced by the Universal Atlas Cement Co.:

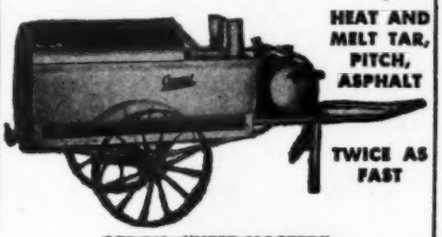
G. L. Lindsay, Engineer of Tests, is appointed Assistant Director Tests & Research.

F. P. Diener, Assistant General Chemist, is appointed Chemical Engineer.

SAVE 50% ON FUEL AND WAITING TIME

HEAT AND MELT TAR, PITCH, ASPHALT

TWICE AS FAST



AEROIL "HEET-MASTER"

Complete outfits on skids or on steel tires, capacities 80, 110 and 165 gallons. All sizes can be obtained with hand spray attachment. Send for FREE BULLETIN No. 194RS. For full information of concrete curbing machines, tool and surface heaters, asphalt tools and accessories, etc. Write for FREE Catalog No. 240RS.

NEW cleaning and degreasing tanks and sprayers to keep equipment in condition (Bulletin 250RS).

AEROIL BURNER CO., INC.
5711 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

C. L. Davis, Assistant Engineer of Tests, is appointed Engineer of Tests.

T. A. Hicks, General Chemist, is retiring after more than 38 years of continuous service with the company.

▼

Change in Advertising Dept. American-Marietta Co.

Grover M. Hermann, President of the American-Marietta Company, announced that two changes had been made in their Advertising Department to meet the requirements of the company's expanding advertising plans.

Robert A. Ornberg, who has been Advertising Manager, is now made Sales Promotion Manager. Relieved of all detail work, he will arrange plans for post-war promotion, handle publicity and create all advertising material for the company's various divisions.

John M. Stiller, Printing Buyer for several years, becomes Advertising Manager and assumes all departmental responsibilities for personnel, direct mail and advertising distribution in addition to his regular production and purchasing duties.

VULCAN

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

VULCAN TOOL MFG. CO.
QUINCY, MASS.

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity-

** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

● Up to 2000 Tons a Day ●

Crushers
Elevators
Sweepers
Screens
Wash Boxes
Bins
Pulverizers
Feeders
Spreaders
Kettles
Conveyors
Drag-Lines
"GAYCO"
Centrifugal
Air Separators

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
140 Canada Cement Co., Montreal, Que., Can.

Take Your Choice . . . They're Both Built for Hard Work and Wear!

"DIXON"

AIR HAMMER COUPLING

Compact Type, Style WLD-7, ½" & ¾"
Heavy Type, Style WHD-9, ¾" & 1"

A washer type coupling, for all rock drill service and many other pneumatic tool operations. Plain design and construction, yet strong, durable and efficient. Corrugated stem, while easily inserted, is practically blow-off proof. Reinforced bolt lugs on clamp will not bend out of shape.

"GJ-DIXON"

AIR HAMMER COUPLING

Compact Type, Style XLD-41, ½" & ¾"
Heavy Type, Style XHD-52, ¾" & 1"

Same as above, except for leakproof *ground joint seal* between spud and stem, instead of washer. No lost or mislaid washers to replace. Easy to connect and disconnect.

• • •

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods.

Buy WAR Bonds—Buy MORE Bonds

DIXON VALVE & COUPLING CO.

Main Office & Factory:
PHILADELPHIA, PA.

Branches:
Chicago Birmingham Los Angeles Houston

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*Advertisers with * are represented in the 1943 edition of Powers' Road and Street Catalog and Data Book. Please refer to it for additional information on any of their products.

"Take care of yourself, Dad"

Last year over 180 *million* man-*days* of productive time were lost through industrial accidents—many of them needless. Think how many tanks, ships, guns, planes those 180,000,000 man-days of work would have made! . . . Yes, dad—take care of yourself. Your soldier-son needs your factory production to win.

American Cable **TRU-LAY PREFORMED WIRE ROPE** is helping keep down accidents every day because it is a safer rope to use and handle. **TRU-LAY PREFORMED** resists kinking and snarling. It resists whipping; spools better. Worn, broken and chisel-sharp crown wires refuse to wicker out to jab workmen's hands. They remain in place, making **TRU-LAY** *much* safer to handle.

Use American Cable **TRU-LAY PREFORMED** for your next rope. Do everything possible to reduce lost-time accidents. America needs your full-time production.

TRU·LAY *Preformed*

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT, CONNECTICUT

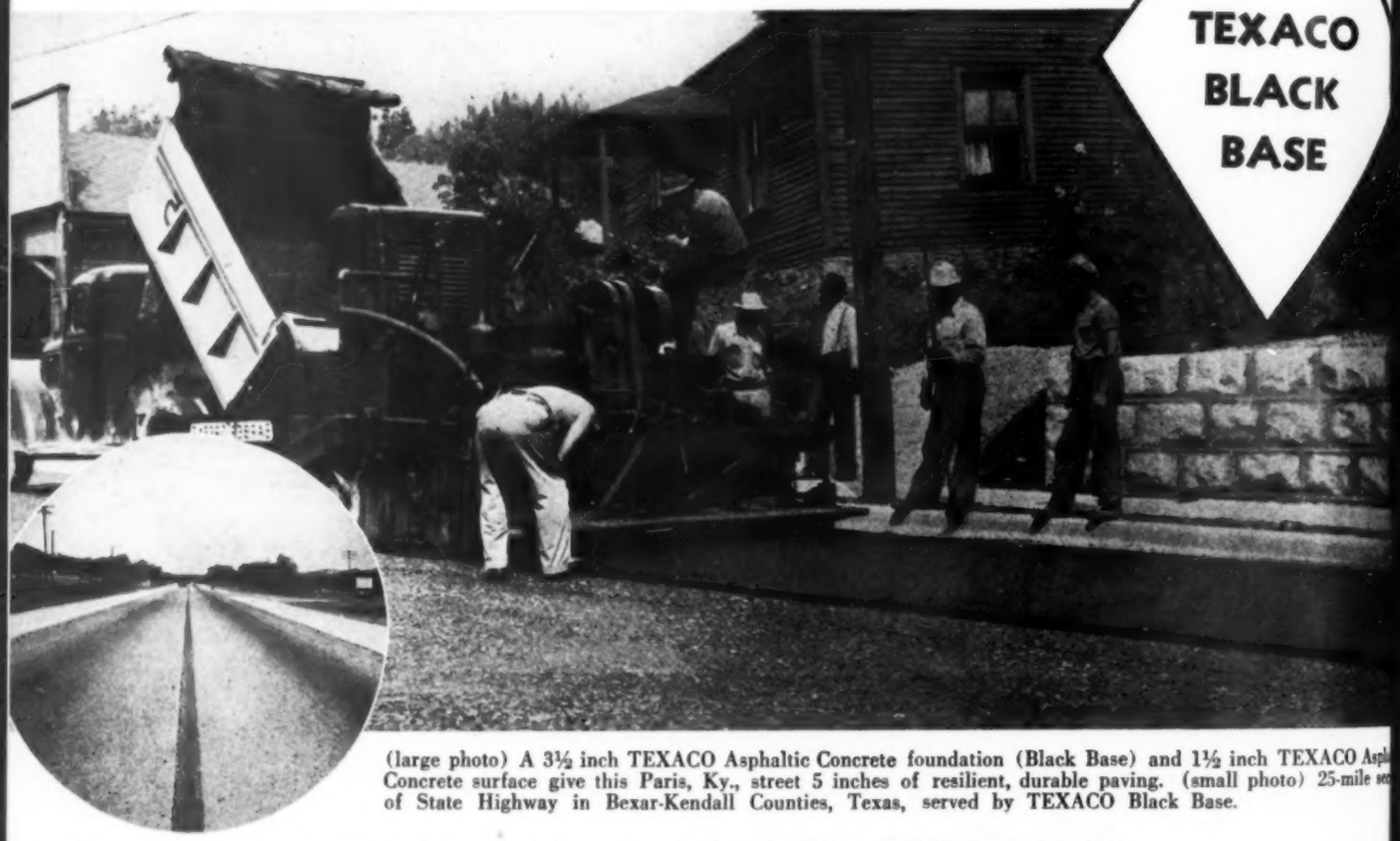
ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Your post-war road or street program

A series of advertisements pointing out
how TEXACO Asphaltic products
can fit into your program

=6

TEXACO BLACK BASE



(large photo) A 3½ inch TEXACO Asphaltic Concrete foundation (Black Base) and 1½ inch TEXACO Asphaltic Concrete surface give this Paris, Ky., street 5 inches of resilient, durable paving. (small photo) 25-mile section of State Highway in Bexar-Kendall Counties, Texas, served by TEXACO Black Base.

Years ago, some road builder referred to an Asphalt foundation as Black Base, and the name has stuck ever since. Black Base consists of coarse graded aggregate bound together by Asphalt Cement.

While TEXACO Asphalt wearing surfaces give years of economical service on all foundations, a TEXACO surface on Black Base has advantages no engineer can overlook.

TEXACO Black Base requires no curing period. It cools quickly to air temperature and is then ready for the surface. This speeds construction . . opens the street, highway or airport to traffic days ahead of a pavement which must be cured.

The same equipment used to mix and construct Black Base is used to mix and construct the Asphalt wearing surface.

A perfect bond forms between Black Base and Asphalt wearing surface, producing a well-knit, resilient structure from top to bottom.

Because TEXACO Black Base is flexible, it maintains contact with the subgrade, insuring permanent subgrade support. That's why the combined thickness of Black Base and Asphalt surface needed is less than the required thickness of a rigid type of construction, resulting in a proportionately lower cost.

The most common type of TEXACO Black Base is plant-mixed Asphaltic Concrete. However, Asphalt Macadam constructed by the penetration method also is used with excellent results.

Include TEXACO Black Base in your plans for post-war street, highway or airport construction. To help you with such plans, a TEXACO Engineer who specializes in Asphalt construction is at your service.

TEXACO
REG. T. M.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd Street, New York City
Boston Philadelphia Richmond Chicago Houston Jacksonville

TEXACO ASPHALT